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FIFTY-FOURTH YEAR — ESTABLISHED 1872

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1926 CONVENTION AND PAPER TRADE ANNUAL NUMBER

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Pulpwood Consumption and Wood Pulp Production

The consumption of pulpwood and the production of wood pulp in 1924 were influenced by the brisk demand for news print paper, according to the report of the Bureau of the Census compiled in cooperation with the Forest Service of the Department of Agriculture. The production of news print was only slightly less than that of 1923, although the combined production of all grades of paper apparently decreased considerably.

Great Drain Upon Spruce

The continued heavy demand for news print paper naturally resulted in a large production of mechanical and unbleached sulphite pulp, the output of the former during 1924 being the largest of record. This means a continuation of the great drain upon the spruce, fir, and hemlock forests of the Northeastern and Lake States, which have been the main source of our pulpwood supply since the beginning of the manufacture of wood pulp paper in the United States.

In general, there has been a plentiful supply of pulpwood during the past year; in fact, during the latter half of the year it was a drug on the market. As a result, prices weakened considerably throughout the producing regions.

Pacific Coast Lumber

For generations spruce has been one of the favorite lumber trees of the Northeast. During the past few years, Pacific coast common lumber shipped east through the Panama Canal, has entered all the eastern markets, western manufacturers having been able to place their product at prices which eastern manufacturers have great difficulty in matching. This has brought about a reduction in lumber production in the spruce forests of the Northeast, and has thereby released for use as pulpwood considerable spruce timber which had hitherto been considered unavailable to the industry.

Hemlock Most Affected in Lake States

In the Lake States the same situation has developed, except that hemlock has been the species most affected. Large quantities were formerly cut for lumber in that region, but during the past two years hemlock has been unable in many markets to compete with Douglas fir from the Pacific coast, and therefore the pulp mills had available more hemlock logs than they could use.

Lowering of Prices

These conditions have resulted in a lowering of pulpwood prices, which in turn has made possible some reduction in the cost of paper manufacture. An ultimate shortage of pulpwood supplies still impends, but the present turn of conditions gives more time to put pulpwood operations upon a continuously productive basis.

THE FOLLOWING STATEMENT SHOWS, FOR 1924, 1923, AND 1919, THE PERCENTAGE OF THE TOTAL CONSUMPTION OF PULPWOOD REDUCED BY EACH OF THE PULP MAKING PROCESSES

Year	Total pulp wood consumed (cords)	Per cent of total reduced by specified process: Sulphite	Mechanical	Soda	Sulphate
1924	5,768,082	46.7	28.5	14.0	10.9
1923	5,872,870	48.8	26.7	14.2	10.3
1919	5,477,832	52.3	28.0	14.6	5.0

THE FOLLOWING STATEMENT SHOWS, FOR 1924, 1923, AND 1919, THE PERCENTAGE OF THE TOTAL QUANTITY OF WOOD PULP PRODUCED BY EACH OF THE PULP MAKING PROCESSES

Year	Total wood pulp produced (tons of 2,000 pounds)	Per cent of total produced by specified process: Mechanical	Sulphite	Soda	Sulphate	Screenings
1924	3,723,266	44.1	35.9	11.8	8.1	(1)
1923	3,788,672	41.4	37.3	11.7	8.2	1.4
1919	3,517,952	43.2	40.3	11.7	3.4	1.3

[1] Not reported.

THE AVERAGE VALUES PER TON, BY EACH PULP MAKING PROCESS AND CONDITION, FOR 1924 AND 1923, WERE AS FOLLOWS

Year	Mechanical: Not steamed	Mechanical: Steamed	Sulphite: Unbleached	Sulphite: Bleached	Soda: Unbleached	Soda: Bleached	Sulphate: Unbleached	Sulphate: Bleached
1924	$30.98	$34.57	$54.73	$82.92	$63.39	$73.69	$50.97	$65.30
1923 [1]	30.89	37.00	60.13	82.24	72.65	76.15	55.81	61.19

[1] Exclusive of screenings.

QUANTITY AND COST OF PULPWOOD CONSUMED, FOR THE UNITED STATES, FOR SPECIFIED YEARS: 1899-1924 WERE AS FOLLOWS

Year	Quantity (cords)	Cost (f. o. b. mill): Total	Cost (f. o. b. mill): Average per cord
1924	5,768,082	$92,671,688	$16.07
1923	5,872,870	95,306,283	16.23
1922	5,548,842	89,895,191	16.20
1921	4,557,179	91,589,103	20.10
1920	6,114,072	116,495,720	19.03
1919	5,477,832	87,386,083	15.95
1918	5,250,794	73,167,118	13.93
1917	5,480,075	60,815,057	11.10
1916	5,228,558	[1] 45,785,682	8.76
1914	4,470,763	39,408,453	8.81
1911	4,328,052	.....	.....
1910	4,094,306	.....	.....
1909	4,001,607	34,477,540	8.62
1908	3,346,953	28,047,473	8.38
1907	3,962,660	32,360,276	8.17
1906	3,661,176	26,411,887	7.21
1905	3,192,123	17,735,665	5.56
1899	1,986,310	9,837,516	4.95

[1] Not including slabs and other mill waste in Louisiana, Massachusetts, North Carolina, and Virginia.

PRODUCTION OF WOOD PULP, BY PROCESSES, FOR THE UNITED STATES, FOR SPECIFIED YEARS: 1899-1924

(Tons of 2,000 pounds)

Year	Total	Mechanical	Sulphite	Soda	Sulphate
1924	[1] 3,723,266	1,643,283	1,336,551	440,697	302,735
1923	[2] 3,788,672	1,580,553	1,448,690	445,162	314,267
1922	[3] 3,521,644	1,483,787	1,374,319	419,857	243,681
1921	[4] 2,875,601	[4] 1,267,382	[3] 1,166,926	300,533	140,760
1920	3,821,704	1,583,914	1,585,834	463,305	188,651
1919	[2] 3,517,952	1,518,829	1,419,829	411,693	120,378
1918	3,313,861	1,364,504	1,456,633	350,362	142,362
1917	3,509,939	1,535,953	1,451,757	437,430	84,799
1916	3,435,001	1,508,139	1,466,402	387,021	73,439
1914	[4] 2,893,150	1,293,661	1,151,327	347,928	52,641
1911	2,686,134				
1910	2,533,976				
		(5)	(5)		
		(5)	(5)		
				(5)	(5)
				(5)	(5)
1909	2,495,523	1,179,266	1,017,631	298,626	.....
1908	2,118,947				
1907	2,547,879				
		(5)	(5)		
		(5)	(5)		
				(5)	(5)
				(5)	(5)
1904	1,921,768	968,976	756,022	196,770	.....
1899	1,179,525	586,374	416,037	177,114	.....

[1] Includes some screenings.
[2] Includes screenings as follows: Mechanical, 12,759 tons; sulphite, 37,463 tons; sulphate, 1,784 tons.
[3] Includes screenings as follows: Mechanical, 12,220 tons; chemical, not shown by process, 35,003 tons.
[4] Includes screenings as follows: Mechanical, 11,769 tons; chemical, not shown by process, 35,824 tons.
[5] Not reported separately.

PRODUCTION OF WOOD PULP, BY PROCESSES AND CONDITION, FOR THE UNITED STATES: 1924, 1923, AND 1919.

(Tons of 2,000 pounds)

Process and Condition	1924	1923	1919
Total	[1] 3,723,266	3,788,672	3,517,952
Mechanical	1,643,283	1,567,794	1,518,829
Not steamed	1,547,332	1,464,081	1,237,194
Steamed	95,951	103,713	281,635
Sulphite	1,336,551	1,411,227	1,419,829
Unbleached	830,271	853,381	910,091
Bleached	506,280	557,846	509,738
Soda	440,697	445,162	411,693
Unbleached	18,164	28,119	27,608
Bleached	422,533	417,043	384,085
Sulphate	302,735	312,483	120,378
Unbleached	279,645	282,492	92,375
Bleached	23,090	29,991	28,003
Screenings	(1)	52,006	47,223
Mechanical	(1)	12,759	12,220
Chemical	(1)	39,247	35,003

[1] Screenings not reported separately; included in total.

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Pulpwood Consumption and Wood Pulp Production

Pulpwood Consumption, by Kinds of Wood, for the United States: 1924, 1923, and 1919

Kind of wood	Quantity (cords) 1924	1923	1919	Per cent distribution 1924	1923	1919
Total	5,768,082	5,872,870	5,477,832	100.0	100.0	100.0
Spruce:						
Domestic	2,079,182	2,195,395	2,313,419	36.1	37.4	42.2
Imported	890,523	1,054,273	873,795	15.4	18.0	15.9
Hemlock	965,359	970,102	795,154	16.7	16.5	14.5
Yellow pine	427,961	419,734	234,463	7.4	7.1	4.3
Poplar:						
Domestic	218,036	152,886	180,160	3.8	2.6	3.3
Imported	157,368	181,808	158,220	2.7	3.1	2.9
Balsam fir	313,018	237,509	288,814	5.4	4.0	5.3
Yellow poplar	128,037	102,781	72,605	2.2	1.8	1.3
White fir	93,296	65,783	31,138	1.6	1.1	0.6
Jack pine	75,775	68,558	51,581	1.3	1.2	0.9
Tamarack or larch	74,659	56,233	44,042	1.3	1.0	0.8
Gum	37,462	43,989	30,355	0.7	0.7	0.6
Basswood	8,248	10,650	9,799	0.1	0.2	0.2
All other [1]	180,198	209,235	219,206	3.1	3.6	4.0
Slabs and other mill waste	118,960	103,934	175,081	2.1	1.8	3.2

[1] Beech, birch, maple, chestnut, cottonwood, Douglas fir, Norway pine, white pine, and willow.

Pulpwood Consumption, by Kinds of Wood and Processes of Manufacture, for the United States: 1924

Kind of wood	Total (cords)	Process of Manufacture (Cords) Mechanical	Sulphite	Soda	Sulphate
Total	5,768,082	1,643,955	2,691,492	806,613	626,022
Spruce:					
Domestic	2,079,182	946,152	1,082,360	.....	50,670
Imported	890,523	457,436	419,403	1,500	12,184
Hemlock	965,359	62,961	857,236	.....	45,162
Yellow pine	427,961	10,444	5,660	103,787	308,070
Poplar:					
Domestic	218,036	10,503	4,874	202,581	78
Imported	157,368	451	.....	156,917	.....
Balsam fir	313,018	95,892	168,838	.....	48,288
Yellow poplar	128,037	.....	.....	128,037	.....
White fir	93,296	42,653	50,643	.....	.....
Jack pine	75,775	12,352	.....	184	63,239
Tamarack or larch	74,659	.....	1,251	3,337	70,071
Gum	37,462	.....	.....	37,462	.....
Basswood	8,248	.....	.....	8,248	.....
All other [1]	180,198	2,297	913	160,160	16,828
Slabs and other mill waste	118,960	2,814	100,314	4,400	11,432

[1] Beech, birch, maple, chestnut, cottonwood, Douglas fir, Norway pine, white pine, and willow.

Imports of Pulpwood, by Quantity, Value, and Condition: 1924, 1923, and 1919

Year	Total Quantity (cords)	Total Value	Total Average per cord	Rough Quantity (cords)	Rough Per cent of total	Rough Average value per cord
Total	3,675,201	$36,972,327	$10.06	884,177	24.1	$9.70
1924	1,279,975	13,107,647	10.24	268,101	20.9	10.41
1923	1,347,927	13,405,927	9.95	374,656	27.8	9.26
1919	1,047,299	10,458,753	9.99	241,420	23.1	9.59

Year	Peeled Quantity (cords)	Peeled Per cent of total	Peeled Average value per cord	Rossed Quantity (cords)	Rossed Per cent of total	Rossed Average value per cord
Total	2,439,813	66.4	$9.80	351,211	9.5	$12.79
1924	885,725	69.2	9.83	126,149	9.9	12.77
1923	855,303	63.5	9.84	117,968	8.7	12.85
1919	698,785	66.7	9.70	107,094	10.2	12.75

Production of Wood Pulp, by Quantity and Value, by States: 1924

State	Qauntity (tons of 2,000 pounds)	Value Total	Value Average per ton
United States	3,723,266	$186,724,129	[1] $50.15
Maine	895,451	41,823,676	46.71
New York	755,156	33,540,521	44.42
Wisconsin	609,081	30,475,682	50.04
Pennsylvania	216,862	16,315,962	75.24
Washington	159,539	5,265,969	33.01
New Hampshire	151,863	11,296,230	74.38
Michigan	145,565	8,080,260	55.51
Minnesota	141,165	6,236,781	44.18
Virginia	136,105	8,620,315	63.34
Louisiana	52,872	2,180,553	41.24
Vermont	45,587	1,672,485	36.69
Massachusetts	30,409	2,181,715	71.75
West Virginia	27,703	1,271,176	45.89
California and Oregon	149,894	4,642,580	30.97
All other States [2]	206,014	13,120,224	63.69

[1] Averages by processes: Mechanical, not steamed, $30.98; steamed, $34.57. Sulphite, unbleached, $54.73; bleached, $82.92. Soda, unbleached, $63.39; bleached, $73.69. Sulphate, unbleached, $50.97; bleached, $65.30.
[2] Delaware, District of Columbia, Georgia, Maryland, Mississippi, North Carolina, Ohio, South Carolina, Tennessee, and Texas. (See State Statistics, p. 3.)

Imports of Wood Pulp, by Quantity, Value, and Processes: 1924, 1923, and 1919

(Tons of 2,000 pounds)

Year	Total Value Total	Total Value Average per ton	Chemical, Unbleached Sulphite Quantity (tons)	Chemical, Unbleached Sulphite Value	Unbleached Sulphate Quantity (tons)	Unbleached Sulphate Value
Total	$187,192,331	$52.94	1,386,689	$74,620,131	719,004	$40,217,634
1924	75,743,067	49.74	629,462	30,092,530	311,353	15,904,350
1923	74,400,883	54.03	517,275	26,548,431	261,739	15,228,747
1919	37,048,381	58.25	239,952	17,979,170	145,912	9,084,537

Year	Chemical, Bleached Sulphite Quantity (tons)	Chemical, Bleached Sulphite Value	Chemical, Bleached Sulphate Quantity (tons)	Chemical, Bleached Sulphate Value	Mechanically Ground Quantity (tons)	Mechanically Ground Value
Total	628,459	$47,724,887	53,345	$3,025,355	748,251	$21,604,324
1924	305,054	21,006,429	30,927	1,549,629	245,920	7,190,129
1923	280,650	22,245,865	17,273	1,080,961	300,078	9,296,879
1919	42,755	4,472,593	5,145	394,765	202,253	5,117,316

Pulpwood Consumption and Wood Pulp Production—Number of Mills Reporting, Quantity and Cost of Wood Consumed, and Quantity of Pulp Produced, by States: 1924, 1923 and 1919

State	Year	Number of mills reporting	Wood consumed Quantity (cords)	Wood consumed Cost (f. o. b. mill) Total	Wood consumed Cost (f. o. b. mill) Average per cord	Pulp produced (tons of 2,000 pounds)
United States	1924	239	5,768,082	$92,671,688	$16.07	3,723,266
	1923	241	5,872,870	95,306,283	16.23	3,788,672
	1919	258	5,477,832	87,386,083	15.95	3,517,952
Maine	1924	32	1,234,172	22,543,471	18.27	895,451
	1923	31	1,273,794	24,711,387	19.40	901,007
	1919	34	1,279,852	24,795,623	19.37	916,764
Wisconsin	1924	43	1,071,284	14,555,767	13.59	609,081
	1923	43	1,043,056	13,706,797	13.14	577,993
	1919	47	854,185	10,242,909	11.99	506,549
New York	1924	75	905,767	18,163,568	20.05	755,156
	1923	81	959,517	18,748,999	19.54	760,199
	1919	84	1,055,145	20,498,405	19.43	811,958
Pennsylvania	1924	13	406,866	7,291,771	17.92	216,862
	1923	13	444,329	7,790,558	17.53	236,900
	1919	14	423,822	6,873,612	16.22	215,686
New Hampshire	1924	8	269,391	5,830,818	21.64	151,863
	1923	7	311,434	6,802,728	21.84	188,323
	1919	10	375,597	7,297,625	19.43	232,134
Michigan	1924	12	251,837	3,738,091	14.84	145,565
	1923	11	231,173	3,462,002	14.98	138,034
	1919	12	207,234	2,586,808	12.48	106,194
Minnesota	1924	7	238,592	3,430,010	14.38	141,165
	1923	7	271,139	3,868,221	14.27	170,609
	1919	6	203,862	2,416,847	11.86	129,560
Washington	1924	6	230,299	2,672,211	11.60	159,539
	1923	5	191,751	2,155,716	11.24	136,943
	1919	4	139,365	1,393,636	10.00	83,575
West Virginia	1924	4	59,799	497,766	8.32	27,703
	1923	4	54,327	479,704	8.83	23,072
	1919	5	83,590	971,376	11.62	39,195
Vermont	1924	6	49,441	896,169	18.13	45,587
	1923	7	87,747	1,523,123	17.36	70,840
	1919	9	111,679	1,682,864	15.07	85,945
Massachusetts	1924	3	48,371	1,040,427	21.51	30,409
	1923	3	47,172	930,713	19.77	31,369
	1919	4	51,981	1,004,840	19.33	32,611
California and Oregon	1924	6	205,968	2,669,711	12.96	149,894
	1923	6	205,199	2,717,337	13.74	162,653
	1919	6	171,765	1,652,462	9.62	123,990
All other States [1]	1924	24	796,295	9,341,908	11.73	394,991
	1923	23	752,232	8,408,998	11.18	390,730
	1919	23	519,755	5,969,076	11.48	233,791

[1] Delaware, District of Columbia, Georgia, Louisiana, Maryland, Mississippi, North Carolina, Ohio, South Carolina, Tennessee, Texas, and Virginia. (See State Statistics, p. 3.)

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PAPER TRADE JOURNAL

With Which Is Combined

Vol. LXXXII. No. 8 [redacted] Thursday, February 25, 1926

The Magazine of the Paper Industry

Paper Industry Expands Steadily in Past Year

Distinct Advance in Production and Volume of Business Registered Over Previous Twelve Months—Margin of Profit Affected by Over-Production and Keen Competition—Manufacturing Output More Stabilized—News Print Consumption and Output Surpasses All Previous Records—Bright Prospects for Current Year

Written Especially for the Annual Number of Paper Trade Journal by H. J. Laughton.

Compared with the previous twelve months in the paper industry, the year 1925 recorded a distinct advance, both in production, and in the volume of business transacted. On the other hand, competition was so keen and production was so heavy, that the margin of profit in most sections of the trade was smaller than it should have been. However, the paper industry is now in a sounder condition than for several years, and the outlook for 1926 is very promising.

Following an excellent beginning in January, business in the paper trade gradually declined until the month of July, when it touched its lowest level. Notwithstanding this depression, however, sales had ranged well ahead of the corresponding period of the preceding twelve months. From July onwards business generally expanded, and when the end of the year was reached it was found that 1925 had surpassed the record of 1924.

Prices Become More Stable

The past year was notable in several particulars. Commodity prices, somewhat higher than in 1924, were more stable than at any time since the war. As between different groups of commodities, there has been little in the way of price maladjustment. Business has not been hampered so much by price uncertainties and discrepancies. Credit has been more ample and money easier. Stability has characterized the general situation.

Manufacturing output has been larger than in 1924. But, more significant, it has been stabilized. Trade, though at a record level, has contributed to the story of stability. Agriculture was definitely removed from its position as a leading and constant cause of worry. The only influence that has caused serious concern in business circles has been speculation, especially in real estate, which has been overdone, in the opinion of many competent authorities.

Banking Situation Sound

The banking system of the United States is in a position of exceptional strength and ability to withstand shock. The year has resulted in a still further decrease in the supply of gold in the country, the net loss being estimated by an expert observer as approximately $150,000,000. In larger amount gold has gone into actual circulation and considerable sums have been withdrawn out of the Reserve Banks in consequence of the policy of distribution which has been followed.

Very nearly $225,000,000 has thus been cut off from the inflated reserve holdings of the Reserve banks and has been transferred either abroad or into the pockets of the public. At the same time, bank operations in general have reached a very high level and prosperity has been the rule in practically all sections of the country and in all branches of the banking business.

Expansion of operations, including both discounts and loans, deposits, investments, savings accounts and practically every other form of transaction, has been broad and widely spread, although it is quite obvious that the most marked advance in operations has been on the speculative side through advances made to those who were able to protect them by security. Actual purchase of investment papers have also grown very largely during the year.

Bright Outlook for 1926

The outlook for 1926 is for a continuation of the prosperous conditions that the country has enjoyed during the past year, in the opinion of the Hon. A. W. Mellon, Secretary of the Treasury. The principal grounds for optimism are the unusually sound condition of business at the present time, the abundance of credit at easy rates, the general conservative temper of the business community, and the prospect of tax reduction and reform. Trade, manufacturing output, and agriculture, are better adjusted to one another than they have been at any time since the war.

Wholesale and retail distribution and manufacturing activity have been steady through the past year at a moderately high level. Speculation in securities has been at a high level but has not been accompanied by boom conditions in industry. In the past, speculation in stocks has usually been accompanied by intensive business activity, forward buying, rapidly rising prices, and increasing interest rates; conditions which have ended prosperity and brought depression in its place.

In the past year none of those things have happened. Prices have remained fairly steady, interest rates low, and business has been conducted with wise caution and conservatism. Purchases have been on a hand-to-mouth basis, so that there are no excessive accumulations of inventories to stand in the way of continued industrial activity. Business men throughout the country seem determined not to let prosperity breed carelessness, and this conservative temper of the business community is one of the most hopeful signs for the future.

New Record in News Print Production

During the past year news print production and output surpassed all previous records. The total North American output reached 3,162,000 tons of news print, compared with 2,900,000 tons in 1924, an increase of 262,000 tons. The mills of the United States manufactured 1,530,000 tons, Canadian mills made 1,522,000 tons,

Newfoundland mills made 97,000 tons and 13,000 tons were manufactured in Mexico.

Incidentally, the North American production was 60 per cent of the world total of 5,000,000 tons of news print. At the same time, due to the unprecedented heavy consumption during the last quarter of 1925, stocks of paper held by both manufacturers and newspaper publishers were lower at the end of the year than for a long time past.

Last year the news print consumption in the United States amounted to nearly 3,000,000 tons. The publishers of the country used all but 23,000 tons of the domestic production, 85 per cent of the Canadian output, 20,000 tons from Newfoundland and 133,000 tons from overseas

Increased newspaper sizes and circulations, stimulated by newspaper advertising, are responsible for the tremendous use of news print. There are now more than 2,400 daily newspapers in North America and 14,000 weeklies, while the circulation of the English language dailies in the United States approaches 34,000,000 copies and of the Sunday issues beyond 23,000,000 copies.

New Machines Installed

Additions to the North American news print manufacturing industry from 1919 to 1925 inclusive have totaled 50 machines of 3,500 tons daily capacity, of which 11 machines were installed in the United States, 35 in Canada, and 4 in Newfoundland. New machines under construction, which are to be installed during the first half of 1926, will make a total manufacturing capacity of 6,300 tons daily in Canada, 5,500 tons in the United States, and 700 tons in Newfoundland.

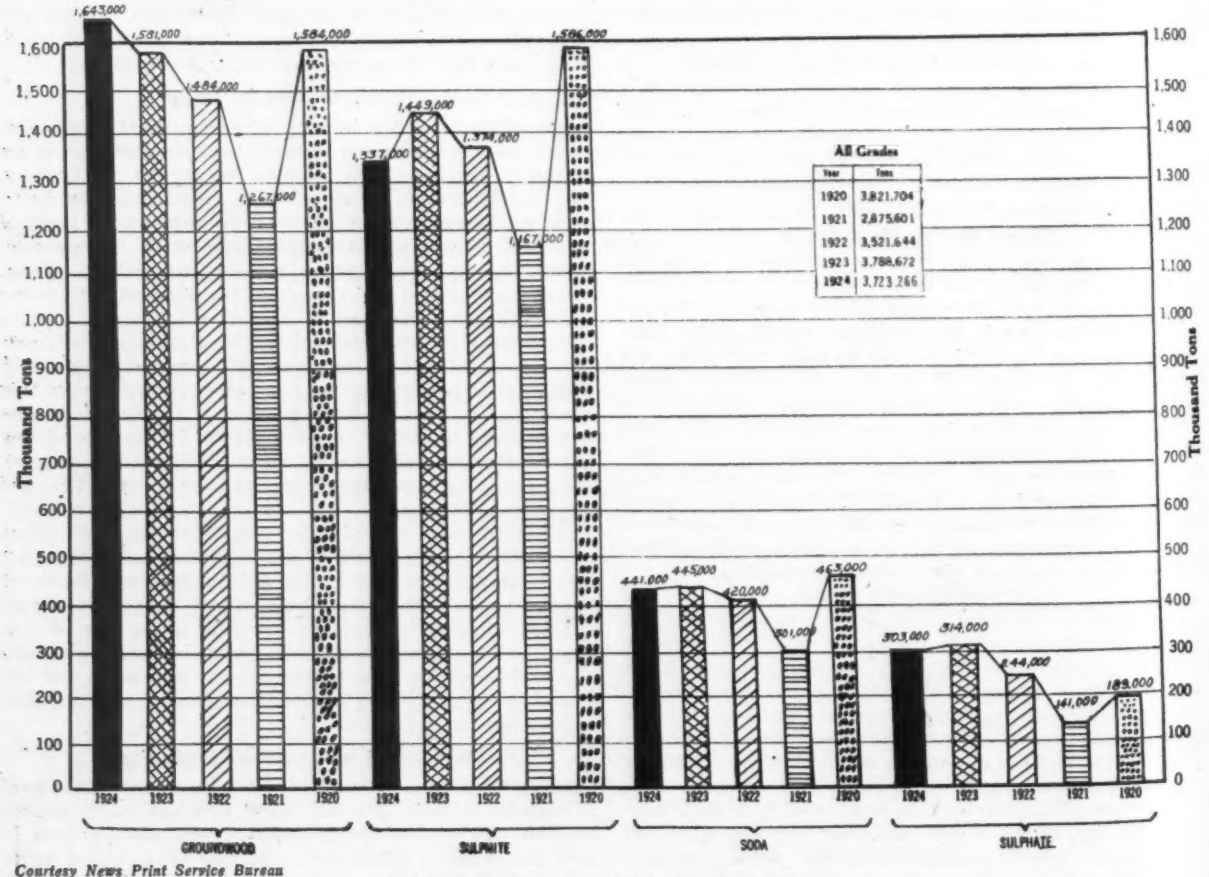
Prices for news print remained very firm during the year and consumers were agreeably surprised when the leading organizations announced a reduction of $5 a ton on contract prices for 1926. As one of the foremost organizations stated, this concession does not indicate lower earnings for the year, but is the result of a reduction in operating costs, cheaper power, ample water supply, and proximity to timber reserves, with consequent cutting of transportation costs.

Fine Paper Sales Expand

Conditions in the fine paper market during the past year were slightly better than in 1924. The volume of business in the writing paper and coarse paper trades was fairly constant and price fluctuations were unusually small. Due to an over-production of tissue paper and a desire on the part of some mills to maintain full production last spring, in the face of a temporarily receding demand, prices in that industry declined considerably.

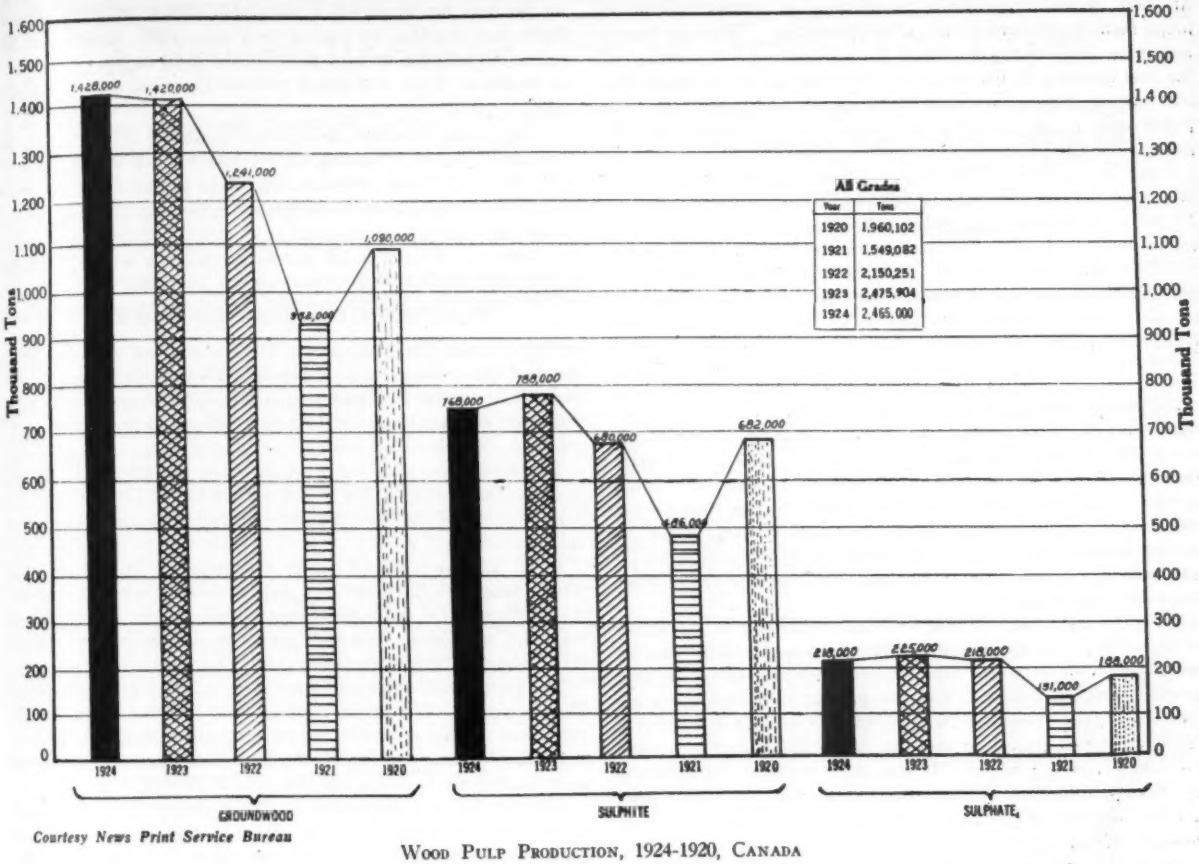
Orders for both the writing and cover paper trades gradually declined from the early part of the year until July, when business expanded steadily until the first of November, when the mills were receiving 100 per cent. From this date orders declined to 80 per cent at the end of the year. Orders for tissues improved from the beginning of the year until the end of January, then declined until the middle of summer, from whence trade increased to 100 per cent in September, and then gradually declined to 80 per cent again by the end of the year.

Writing paper sales for the first half of 1925, compared with the first six months of 1924 were 2 per cent higher in dollars, and 5 per cent higher in tons. Sales for the entire year of 1925 as compared with 1924 were 6 per cent higher in dollars, and 10



Courtesy News Print Service Bureau

WOOD PULP PRODUCTION 1924-1920, UNITED STATES



Courtesy News Print Service Bureau

WOOD PULP PRODUCTION, 1924-1920, CANADA

per cent higher in tons, showing an increase in demand for lower grade papers. Sales for cover paper for 1925 as compared with 1924 were 3 per cent higher in dollars and in tons.

Book Paper Mills Experience Good Year

The book paper mills enjoyed a satisfactory year, consumption running fairly uniform at approximately 90 per cent capacity. Magazines and trade papers were the greatest users of this grade of paper, although the demand experienced from the lithographers, label printers and envelope and tablet manufacturers was steady and healthy.

During the year eight new book paper machines were installed with an estimated capacity of about 325 tons for 24 hours. The market has apparently taken up this increase in a fairly satisfactory manner. Production during the year reached 1,400,000 tons. A number of new machines are to be installed during 1926 and it is predicted that the increased consumption will keep pace fairly well with the increased production.

With very few exceptions prices remained firm throughout the past year. Some price concessions were made during the quiet season in the middle of the summer. A greatly increased demand in the early autumn resulted in a much stronger market, and, taking the year as a whole, prices were well maintained. Manufacturers are showing a tendency to expand and the outlook for the current year is very promising.

Coarse Paper Market Gradually Improves

Competition proved very keen in the coarse paper market during the past year. This condition resulted in the lowering of values in the earlier months. As time went on, however, business improved, and with the broader resumption of industrial activities in the autumn, prices became more steady and finally rose to levels that gave opportunity for fairer margins of profit.

An important factor in bringing business and prices to a steadier and firmer foundation was the work of the trade associations, which brought about a better understanding in contact with distributors and so stabilized the market. Altogether, the entire year proved a trifle better than the corresponding period of 1924.

An encouraging feature of the past year was the progress of southern kraft, which became an important factor in the situation due to the scarcity of foreign kraft. Wrapping tissues fluctuated, but became very firm towards the close of the year, due to the strengthening of the sulphite market.

The paper bag situation was not so good, despite efforts to stabilize distribution. Some observers express the opinion that conditions will improve in the near future. Colored specialties for wrapping purposes have been in good demand on account of their distinctiveness.

The greatest problem in the coarse paper industry is overhead. Proper consideration to the thorough study of costs of doing business, and courage to mark up to a just profit, should be the aim of all associations and paper houses.

Record Production of Paper Board

Production of paper board and paper board products during the past year reached a new high record. This section of the paper trade represents nearly 30 per cent of the total paper tonnage. Approximately 70 per cent of the raw materials used in the manufacture of paper board consists of otherwise worthless material, a fact which emphasizes the importance of the industry to the country.

One of the most noteworthy events of the year was the formation of the Paperboard Industries Association by a consolidation

of three former associations representing a tonnage volume of more than 70 per cent of the total production. This new organization is doing wonderful work for the general advancement of the best interests of the industry. The Paperboard Industries Association is composed of three groups, or divisions, viz: The paperboard, or paper mill group; the container, or shipping case group; and the folding box, or carton group.

Paper board mill operating time during 1925 was estimated at 92 per cent of capacity, with a high of 98 per cent and a low of 79 per cent. Fluctuations between months were not so great as in former years, and the more uniform running gave greater efficiency and larger output. However, competition during the past year, urged on by over-capacity, has been such that, while month by month, fluctuations have occurred, only a small change in average prices took place.

Wood Pulp Unusually Strong

Following a quiet period at the beginning of the year, the chemical pulp market began to improve in February, with the result that business during the first half of 1925 proved satisfactory. Due to the unusually early opening of the Baltic a fair amount of unexpected and satisfactory business was transacted in Swedish pulp, both in the United States and Europe. Upon the arrival of Swedish and Finnish shipments in May and June the market held firm and prices were higher in June than in any previous month of the year.

A number of buyers evinced sufficient confidence in the future to cover their requirements for 1926. By covering their requirements early they secured their favorite grades at lower prices than prevailed late in the year. At the present time, the Scandinavian and Finnish pulp mills are booking orders for deliveries in 1927 and several important contracts have been closed at around last year's contract prices. It has been reported that Sweden has already sold about 200,000 tons of sulphite and kraft pulp, and that Norway and Finland have also accepted large orders for shipment during 1927.

The increased tonnage of bleached sulphite used in the manufacture of artificial silk, or Rayon, has increased tremendously and has become a big factor in the ready sales of chemical wood pulp. It is possible that the tonnage of bleached sulphite used for this purpose during 1925 was at least 75,000 tons.

Paper Stock Conditions Variable

While the volume of business transacted in the paper stock market during 1925 was satisfactory, keen competition seriously affected the margin of profit. The easing off of rags was, perhaps, the outstanding feature of the year. The softening of prices was generally attributed to weakness in roofing, which is generally regarded as the key to the rag situation. Due to the call for sulphite papers, the better grades of rags also declined. Mixed rags remained high due to the price of woolens.

In the waste paper market, old kraft and new cuttings soared to new high levels. Soft and hard white were very steady throughout the year but there was a noticeable falling off in book stock, the market reaching the lowest level since 1921. Book stock improved towards the close of the year, the mills coming in for heavier tonnages. News and mixed reflected the condition of the board mills.

After holding firm for the first six months of 1925, rope fell off through the summer months, until prices reached the lowest level since 1921. Rope suffered somewhat from the fact that the mills substituted other grades in combination with pulp. Bagging was in strong demand all through the year for both paper making and breaking up. Prices of all grades of bagging advanced to the high limits realized in the boom market of 1920.

Paper Makers' Chemicals Enjoy Good Year

Both consumption and prices of paper makers' chemicals were steadier and more normal during 1925 than at any time since the war. The volume of business transacted proved the largest since 1920, while prices tended to become stabilized at the higher levels reached.

Production was also increased by many manufacturers beyond their original estimate, due to the heavier demand, particularly for Caustic Soda, Soda Ash, Sulphate of Alumina, and many other paper chemicals.

In the autumn, the price for spot shipment of bleaching powder was advanced to $2.00 per 100 pounds, which quotation was also made effective for contract shipments during 1926. Paper makers also used chlorine in increased quantities and the consumption of this product is rapidly expanding.

The Interstate Commerce Commission ruled in favor of placing the new multiple tank car on an equal basis with the old time single tank, thus making it possible to use this new method for the shipment of all carloads of liquid chlorine. This important ruling will greatly facilitate handling and shipment to the paper mills.

Salt cake, being a by-product, has been affected as to production during the entire year by conditions in muriatic acid, and against this there has been developing the demand for salt cake from the rapidly growing kraft pulp mills of the southern states. Due to a scarcity of tonnage, the price of salt cake advanced steadily durng the year and a firm market developed.

B. T. McBAIN LEAVES COLUMBIA MILLS

B. T. McBain, general manager of the Columbia River Pulp and Paper Mills, Vancouver, Wash., has tendered his resignation, effective March 1. He will remain in touch with the plant until the return of F. W. Leadbetter, president of the company, who sailed for Europe this week on a sixty-day trip.

Mr. McBain is vice-president of the Oregon Paper Mill Company of Los Angeles, and will spend part of his time in that city. Later upon his return from an eastern trip he will be associated with F. W. Leadbetter in his Portland headquarters in the Oregonian Building.

PLANT JUST COMPLETED OF THE PACIFIC STRAW PAPER AND BOARD C O., LONGVIEW, WASH.

A Record Breaking Year in News Print Paper

Mills on the North American Continent Produced 3,162,000 Tons During 1925—Of This Amount 1,530,000 Tons Were Made in the United States and 1,522,000 in Canada With Canada Leading the United States During the Final Months of the Year—From 1919 to 1925 There Have Been Fifty News Print Machines Added to the North American Industry—Many Other New Machines Under Construction.

Abstract of Report of R. S. Kellogg, Sec. at Annual Meeting of News Print Service Bureau.

The rest of the paper world has become accustomed to seeing the news print makers and users set new records, and 1925 was the greatest yet, with a total North American output of 3,162,000 tons or 9 per cent more than in 1924, and a North American consumption equivalent to 98 per cent of the production.

U. S. Only Slightly Ahead of Canada

For several years Canada has been aspiring to displace the United States as the world's premier news print paper producer, and the race in 1925 was neck and neck, with Canada a few tons ahead during each of seven months and only 8,000 tons behind on the year's total. The final figures show 1,530,000 tons made in the United States, 1,522,000 tons in Canada, 97,000 tons in Newfoundland and 13,000 tons in Mexico, making a Continental total of 60 per cent of the world total of some 5,000,000 tons of newsprint. The United States output was 3 per cent more than in 1924 and 1 per cent greater than in the previous record year of 1920, while Canada made 12 per cent more than in 1924 and 74 per cent more than in 1920. In the face of all this, stocks of paper in the hands of both manufacturers and newspaper publishers were lower at the end of the year than for a long time past, due to the unprecedently heavy consumption during the last quarter of 1925.

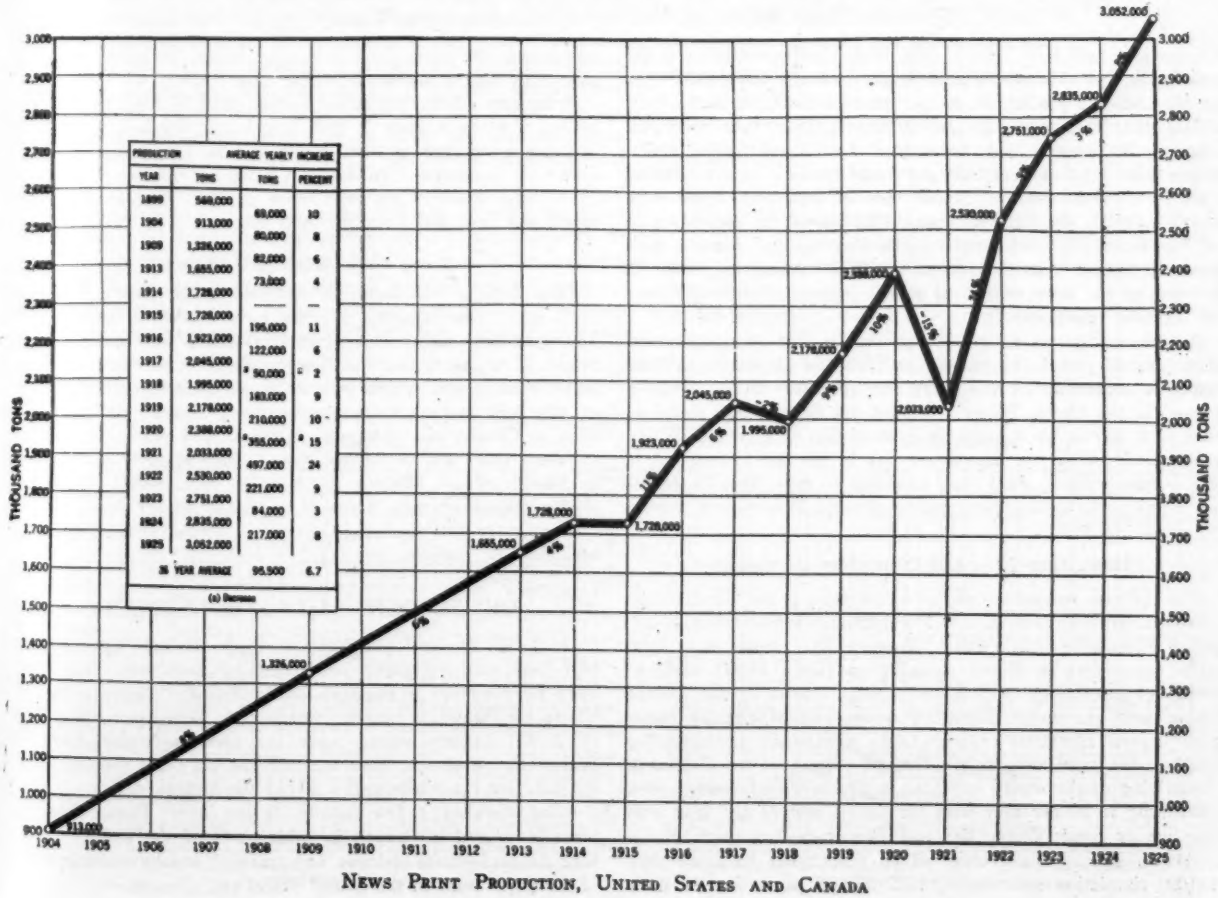
There has been no change in Mexican news print production for several years, but an increase of 52 per cent over 1924 in Newfoundland was the beginning of an enlarged production in that colony which will be still more marked in 1926.

Consumption of News Print in U. S.

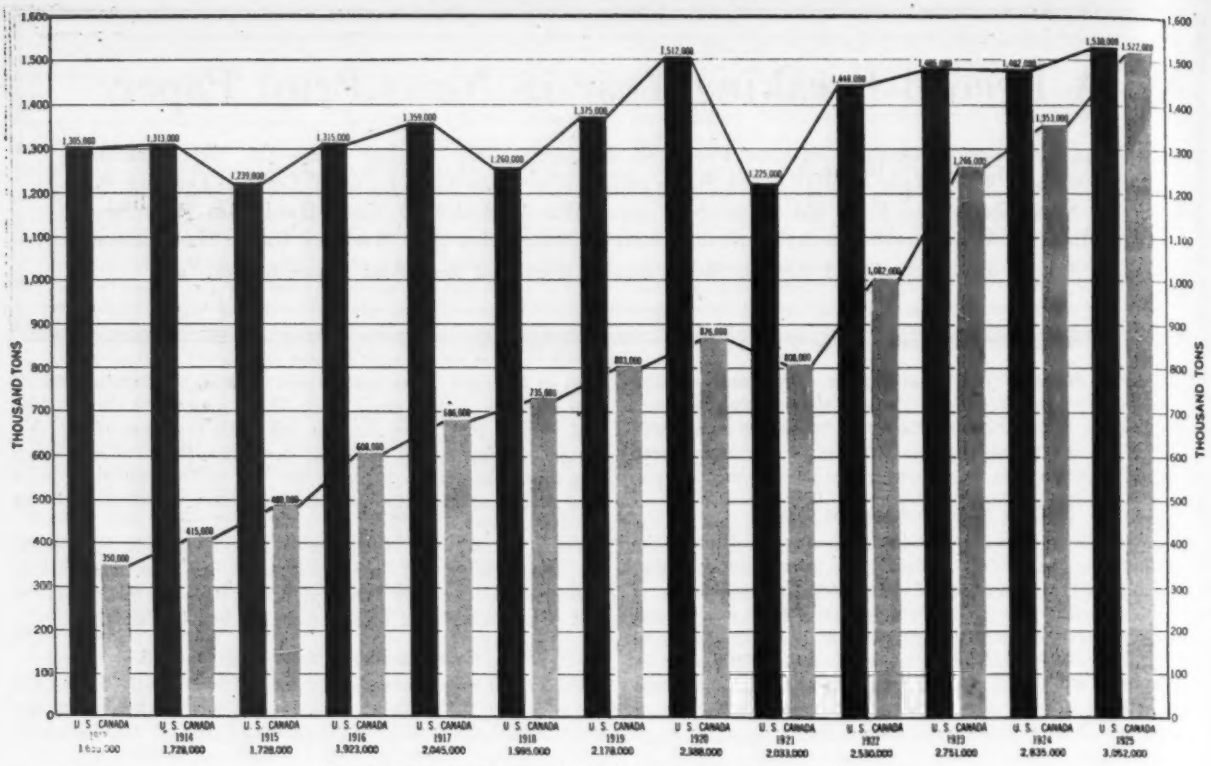
News print consumption in the United States in 1925, amounting to nearly 3,000,000 tons, if spread out in a single sheet would cover 20,000 square miles or the combined areas of Massachusetts,

PRODUCTION		AVERAGE YEARLY INCREASE	
YEAR	TONS	TONS	PERCENT
1899	568,000		
1904	913,000	69,000	10
1909	1,336,000	80,000	8
1913	1,655,000	82,000	6
1914	1,728,000	73,000	4
1915	1,728,000	———	—
1916	1,923,000	195,000	11
1917	2,045,000	122,000	6
1918	1,995,000	(a) 50,000	(a) 2
1919	2,178,000	183,000	9
1920	2,388,000	210,000	10
1921	2,033,000	(a) 355,000	(a) 15
1922	2,530,000	497,000	24
1923	2,751,000	221,000	9
1924	2,835,000	84,000	3
1925	3,052,000	217,000	8
18 YEAR AVERAGE		96,500	6.7

(a) Decrease



NEWS PRINT PRODUCTION, UNITED STATES AND CANADA



NEWS PRINT PRODUCTION, 1913-1925, UNITED STATES AND CANADA

Connecticut and New Jersey. To furnish this amount for the news print users in the United States took all but 23,000 tons of the domestic production, 85 per cent of the Canadian output, 133,000 tons from overseas and 20,000 tons from Newfoundland. Imports of overseas news print into the United States, which began with 50,000 tons in 1920 and reached a maximum of 200,000 tons in 1923, dropped to 156,000 tons in 1924 and 23,000 tons lower in 1925. On the other hand, 1925 marks the definite entry of Newfoundland news print into the United States market, with a much greater amount to come in 1926. Altogether, only 51 per cent of the news print used in the United States in 1925 was of domestic production.

A consumption of 52 pounds per capita last year, compared with only 25 pounds as recently as 1910 and 42 pounds in 1920 indicates something of the inveterate appetites of the printing presses in the United States. It must not be assumed, however, that such a rate of increase in consumption will be indefinitely maintained. What the maximum may be no one knows, but it will obviously take a good while longer to go from 50 to 75 pounds per capita consumption than it did to go from 25 pounds in 1910 to 50 pounds in 1923.

Newspaper Sizes and Circulation Increasing

The present tremendous use of news print is the direct result of increased newspaper sizes and circulations, stimulated by news paper advertising. The latest directory lists more than 2,400 daily newspapers in North America and some 14,000 weeklies, while the circulation of English-language dailies in the United States now approaches 34,000,000 copies and of Sunday issues goes beyond 23,000,000 copies. Daily newspapers in increasing numbers are penetrating to the farthest corners of the Continent. As striking as the steady increases in circulation of these papers, amounting to 21 per cent with the dailies and 37 per cent with the Sunday issues during the past five years, has been the increase in sizes. The average of 60 newspapers of more than 100,000 circulation each during 1925 was 29 pages for the daily issues and 109 pages for the Sunday issues, an increase of one page daily and 6 pages on Sunday over 1924.

Newspaper advertising in the leading cities of the United States totaled 5 per cent more in 1925 than in the previous year and 6 per cent more than in 1920, which was an advertising year not soon to be forgotten. On the other hand, the volume of periodical advertising, while 3 per cent more in 1925 than in 1924, was still 1 per cent less than the 1920 record.

News Print Machine Additions

From 1919 to 1925 inclusive, additions to the North American news print manufacturing industry have totaled 50 machines of 3,500 tons daily capacity, of which 11 machines were in the United States, 35 in Canada and 4 in Newfoundland. Other new machines under construction which will be installed during the first half of 1926 will make a total manufacturing capacity of 6,300 tons daily in Canada and 5,500 tons in the United States, in addition to which there will be by that time a daily capacity of 700 tons in Newfoundland. During the past six years actual production of the news print mills has averaged about 90 per cent of rated capacity. On this basis, a Continental output of 3,500,000 tons will soon be possible.

DR. ZANDERS SAILS FOR GERMANY

Dr. J. W. Zanders, who has been in the United States for the past year studying paper manufacturing conditions, sailed last week for his home in Bergisch-Gladbach, near Cologne, Germany. There his family is largely interested in the papermaking firm of J. W. Zanders where paper has been made for over 100 years. At the present time the mill has six paper machines and six vats for handmade paper, all of the highest quality.

After spending a few months at his home, Doctor Zanders plans to extend his travels in other parts of the world. While here he made many friends and traveled widely, visiting many of the paper mills in the United States and Canada.

Constant Volume of Business in Fine Papers

Writing Mills Made and Shipped More Paper in 1925 Than at Any Time in Their History—In Tissue Papers Prices Declined Considerably Due to a 30 Per Cent Over-production and a Desire on the Part of Some Mills to Maintain Full Production in the Face of a Temporarily Receding Demand—Prices Not Likely to Show Much Change in 1926—Outlook for This Year Encouraging.

Written Especially for the Annual Number of the Paper Trade Journal by Emmett Hay Naylor, Sec.-Treas. of the Writing, Cover and Tissue Paper Manufacturers' Associations.

In reviewing the conditions in the Fine Paper Market through the past year of 1925 and up-to-date, reference is made only to writing, cover and tissue papers in their various grades.

In the writing paper and cover paper markets, the outstanding facts for 1925 are an unusually small amount of price fluctuation and a fairly constant volume of business. In fact, in writing paper, the mills for 1925 made and shipped more paper and reported a larger volume of sales than at any time in their history. In tissue paper, prices have declined considerably, in some instances below cost, due to a 30 per cent over-production and a desire on the part of some mills to maintain full production last spring in the face of a temporarily receding demand.

Production and Sales

In the first three weeks of 1925, orders for writing paper jumped from 90 per cent to 115 per cent and then came a gradual decline until they had receded to 78 per cent by the first of July. Quite unexpectedly, in the middle of the summer, business picked up and orders increased to 90 per cent by the first two weeks in August, but then dropped off to 80 per cent the first of September. Once again they began to increase until by the first of November the mills were receiving 100 per cent; then came a decline to 80 per cent at the end of the year, with an increase to 110 per cent to date.

The same is true of cover papers, whereas in tissue the business picked up from the first of the year at 78 per cent to 95 per cent by the end of January, and then declined and stayed around 80 per cent until the middle of summer, when it went up to about 100 per cent in September and then gradually declined to 80 per cent again by the end of the year, but is once more on the up-grade.

The production and shipments of the writing and cover paper mills through 1925 were very close together, and followed the volume of orders. The end of the year found the mills with only normal stocks of paper on hand. The tissue mills, however, through the first half of 1925, as stated above, maintained production in excess of shipments and orders, but during the last half of the year they began to reduce stocks and hence shipped out more paper than they made. Production in tissue paper during the summer was considerably less than in the middle of April and October.

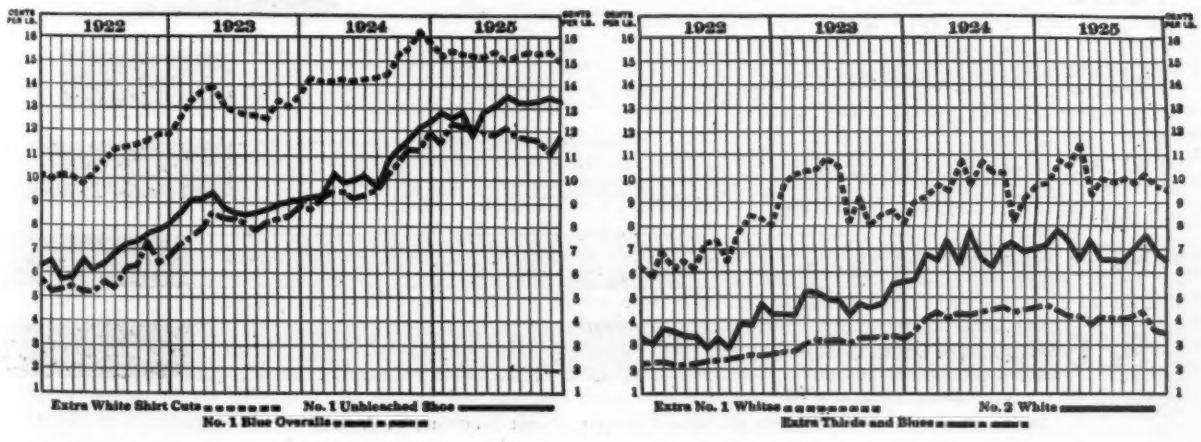
The sales of writing paper for the first half of 1925, compared with the first six months of 1924, were 2 per cent higher in dollars and 5 per cent higher in tons, whereas the sales for the entire year of 1925 as compared with 1924 were 6 per cent higher in dollars and 10 per cent higher in tons, showing an increase in demand for lower grade papers.

The sales for cover paper for 1925 as compared with 1924 were 3 per cent higher in dollars and in tons.

Tendency in Grades

It is interesting to note that in writing paper 64 per cent of the total production is now composed of wood paper. The rag content paper mills have not lost any tonnage over the past ten years, but they have not participated in the normal growth of the industry. There has been, during 1925, however, a marked firmness in demand for rag papers, so that the mills making those grades are in a much stronger position, even though there has been an 11 per cent increase throughout the year in the total volume of papers made from wood. There have been no changes in cover paper grades, but in the tissue paper market there has been an unusually large increase in toilet paper tonnage. For example, one mill is putting in one machine which alone is capable of making about 7,500 tons of toilet paper a year, which is equal to the entire normal growth of the toilet paper industry

THE COURSE OF RAG PRICES



in one year. The tendency seems to be, in the toilet paper market, for the mills to put in larger and faster running machines in order to keep up with competition. Business in this market is based chiefly on volume production and efficiency of distribution. It has been found with the larger units that the advertised mill lines are the more profitable.

Raw Materials

Throughout the year the price of contract bleached sulphite pulp remained the same. There has been a slight increase in the bleached sulphite pulp in the open market. Wages for labor are still 132 per cent above the 1915 level, and there is apparently no possibility of their changing.

Rags during the past few years have shown the most important advances of any cost items in paper making.

In the chart presented herewith is traced the price trends of a few grades of new and old rags during the past four years. An average of the six leading grades—three new cuttings and three old rags—shows the following changes in January, 1926:

Declined 6 per cent over January, 1925.
Increased 14 per cent over January, 1924.
Increased 28 per cent over January, 1923.
Increased 75 per cent over January, 1922.

The peak in rag prices was reached in February, 1925. Since that time average rag prices have declined 10 per cent. Even with this decline, rag prices are still 28 per cent above the level of January, 1923, which advance has been largely absorbed by mill costs through no changes in paper prices.

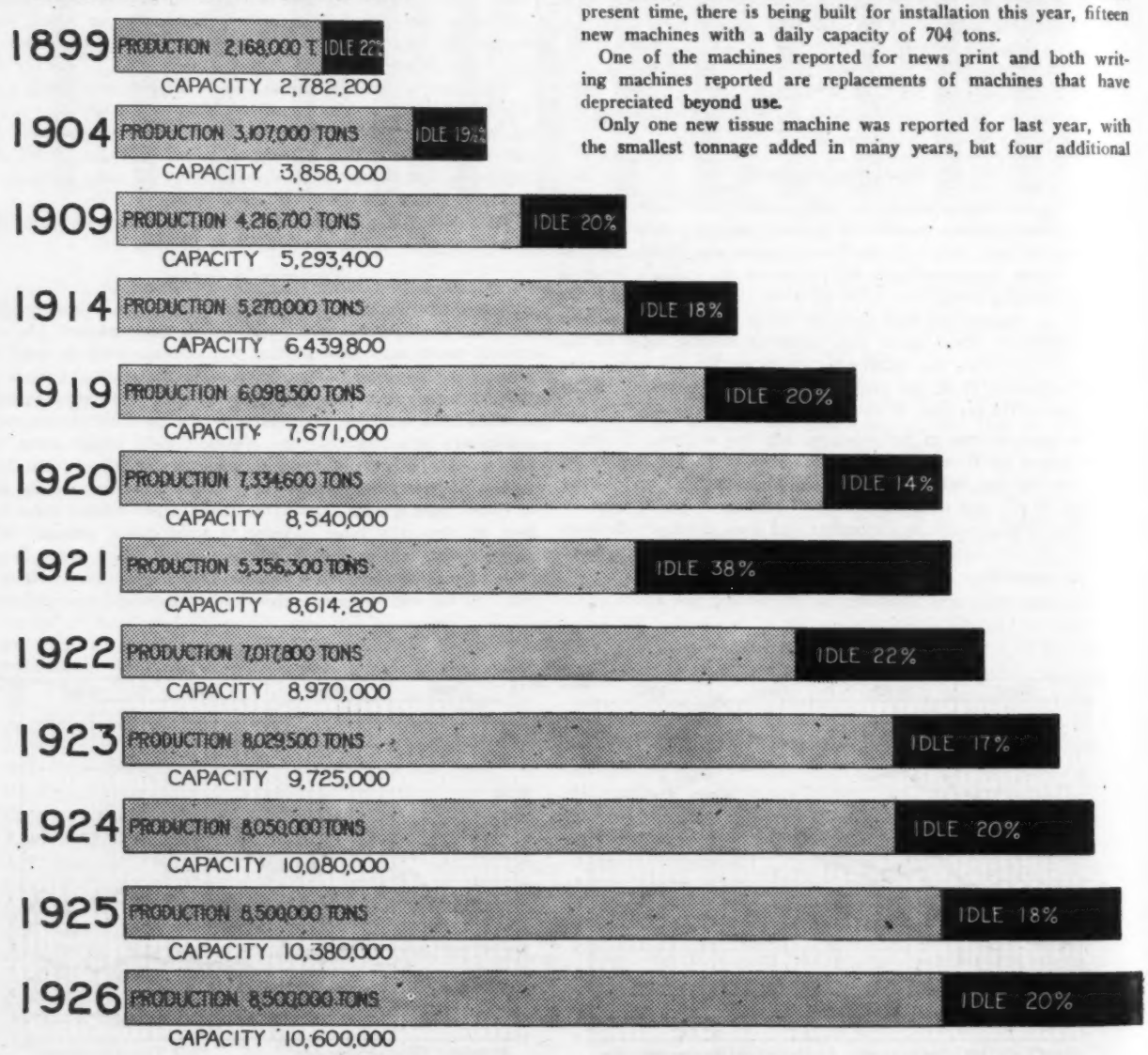
The stocks on hand January 1st showed that the mills were in the best position that they have been in at any time during the last two years. Total stocks are about 8 per cent above normal. The inventory of new cuttings is at normal and is now the highest in twenty-three months. This shows an almost complete recovery from the severe shortage of the summer and fall of 1924. The stocks of old rags have been liquidated somewhat from the peak of a year ago, but are still 15 per cent above normal.

Installation of New Machines

Reports received from paper machine manufacturers show that twenty-four new paper-making machines, with a daily capacity of 998 tons, were installed in the United States in 1925. At the present time, there is being built for installation this year, fifteen new machines with a daily capacity of 704 tons.

One of the machines reported for news print and both writing machines reported are replacements of machines that have depreciated beyond use.

Only one new tissue machine was reported for last year, with the smallest tonnage added in many years, but four additional



EXCESS MACHINE CAPACITY, PAPER INDUSTRY, U. S. A.

GENERAL VIEW OF ENLARGED KENOGAMI PLANT OF PRICE BROS. & CO.

machines with a daily capacity of 59 tons are planned for 1926. This branch of the industry is already over-burdened with far more capacity than it can use in the next few years.

The largest increase in the years 1924 to 1926 was in book paper. Eighteen new book machines will have been installed by June of this year, in a period of two and one-half years. These eighteen book machines have a daily capacity of 840 tons, and an annual capacity of about 250,000 tons, which is 21 per cent of the total book paper production for 1923.

During the same period, nineteen new wrapping paper machines were added. These have a daily capacity of 682 tons and an annual capacity of about 200,000 tons, which is 20 per cent of the 1923 production for wrapping papers.

Thirteen new machines were reported since the beginning of 1924 for tissue paper. These have a daily capacity of 211 tons, or an annual capacity of approximately 63,000 tons, which is 25 per cent of the 1923 production of tissue paper.

Although two of the three new writing machines reported in the last three years were replacements, the capacity of this branch of the industry was no doubt enlarged by the shifting of machine capacity from other grades to sulphite bond.

As indicated in the chart, the United States census report of the capacity of the paper industry at the end of 1923, shows 9,725,300 tons. By the middle of this year, there will have been added in the last two and one-half years, approximately 865,000 tons, bringing the capacity close to 10,600,000 tons per year. This is an increase of 65 per cent over the capacity of 1914. The paper production of last year was approximately 61 per cent higher than the production of 1914.

Outlook for This Year

The outlook for this year for writing paper is encouraging although there may be some recession in demand this summer, whereas the cover paper demand will doubtless remain good throughout the entire year. The sheet tissue market should be good throughout the year, but the toilet paper market will be highly competitive with better values obtaining as the year goes on. There is no reason to believe that the values for any of the higher grade papers will be lower through 1926 because costs are remaining practically the same, and all these papers have been liquidated to as low a point as their profits will permit; in fact, most of the fine paper mills found at the end of 1925 that their profits were indeed hardly commensurate with the capital invested and their expenses, yet there is no reason to believe that the values will change particularly one way or the other throughout the year.

WHAT IS OPEN PRICE ASSOCIATION?

What is an open price association? That is the question which is troubling officials of the Federal Trade Commission who are now making the investigation directed by the resolution passed at the last session of Congress and introduced by Senator McKellar, of Tennessee.

The Commission has sent out questionnaires to trade associations throughout the country, but after all this information has been assembled the Commission will have to decide the question as to what an open price association really is. Reports persist that many of the trade associations are refusing to answer the questionnaire of the Commission. This will necessitate, it is understood, the undertaking of considerable field work by experts of the Commission. It will probably be months before this investigation is completed and the Commission's findings made public.

Such little information as has leaked out indicates that the majority of the associations are operating within the interpretation of the law and in conformity with the ruling by the United States Supreme Court. The Commission in its monthly review of its activities has only the following to say about "open price associations."

"On March 17, 1925, the Senate directed the Commission to investigate the number and importance of open price associations, the effect of their activities on prices and the nature of their other activities with particular reference to alleged violations of the anti-trust laws. This inquiry was initiated immediately after the opinion of the Attorney General as to the availability of the appropriation for this work, was received."

PAPER MILLS FOR NEWBURG, ORE.

C. K. Spaulding will head a paper mill project at Newburg, Ore., if tentative plans carry as is expected at present. Mr. Spaulding recently disposed of a large interest in the Oregon Pulp and Paper Company at Salem when F. W. Leadbetter bought control of this mill.

Mr. Spaulding is president of the Spaulding Logging Company and has been hoping for many years to start a paper mill at Newburg, in which city he got his start over forty years ago.

Financial assistance is already almost fully assured, the Chamber of Commerce at Newburg being strongly back of the proposed enterprise, a considerable amount of money being already pledged and a campaign under way for completing funds.

An experienced paper man is available to take charge of the proposed mill, but his name has not yet been divulged by the company. The new plant will represent an investment of at least $1,250,000 at first and the buildings will be built to permit placing of another paper machine when necessary. It is expected to give employment to over a hundred men in the beginning.

Newburg is an ideal location for a paper mill, according to experts who have surveyed the natural advantages. There are excellent water and rail advantages; cheap fuel from the sawmill, the best highway connection with Portland and sufficient and reasonable electric power.

The plan is for a mill that can produce any kind of paper, according to needs. The building work will take from a year to fifteen months after the start is definitely made.

Book Papers Have A Fairly Satisfactory Year

Consumption Greater Than Ever Before in the History of the Industry Causing Mills to Run at Over 90 Per Cent of Capacity—Prices Firm Throughout the Year With the Exception of a Little Price Cutting During the Summer—Tendency to Expand Has Kept Consumption Ahead of Production Making It Difficult to Show Fair Return on Capital Invested. Outlook for Current Year Is Quite Encouraging.

Written Especially for the Annual Number of the Paper Trade Journal.

In reviewing the book paper division of the Paper Industry for 1925, it can be said that the manufacturers of this line have enjoyed a fairly satisfactory year.

Mills Operating at 90 Per Cent

The consumption has apparently been running fairly uniform at something over 90 per cent of the capacity of the mills. The consumption of book paper during this period has no doubt been greater than ever before in the history of the country. The magazines, which are the greatest users of this grade of paper, have enjoyed a constantly increasing circulation and advertising patronages, while other large consumers of book paper have also enjoyed a steady and healthy business.

Prices With Few Exceptions Firm

Prices have remained firm through the season with very few exceptions. During the quiet season, the middle of the summer, some price cutting was done, but the increased demand in the early fall had a tendency to establish a firmer market, and taking the year as a whole, very little, if any, complaint can be made about lowering prices.

Production Constantly Increasing

The production of book paper has been constantly increasing. During 1925 there were eight new book paper machines installed, with an estimated capacity of about 325 tons for twenty-four hours. The market seems to have taken up this increase in a fairly satisfactory manner. The normal annual production of book paper, which takes in various grades that are usually manufactured by book mills and therefore classified under the book Paper Industry, is about 5,000 tons per day, or 1,550,000 tons annually. The production during 1925 was something over 90 per cent, or about 1,400,000 tons.

Production Constantly Ahead of Consumption

The tendency on the part of the manufacturers to expand has kept the production ahead of the consumption, which usually means weakening in the price situation, and acceptance of orders at prices lower than are warranted on the basis of costs, thereby making it difficult to show a fair return on the capital invested.

New Machines Contracted For

There are a number of new paper machines contracted for that will be installed during 1926, but the general business situation is encouraging and unquestionably the increased consumption will keep pace fairly well with the increased production.

Large Expansion Recently

The expansion in the book paper trade, for a period of two and one half years, has been very large. By June, 1926, there will have been installed in this period, eighteen new machines, with capacity of 840 tons daily or 250,000 tons annually, which will mean an increased production of about 20 per cent over the production in 1923.

Notwithstanding this expansion, 1925 may be looked upon as having been satisfactory to the manufacturers of this grade of paper, and the outlook for 1926 is encouraging.

WATERVLIET CO. ORDERS NEW MACHINE

The executive committee of the Watervliet Paper Company, Watervliet, Mich., has placed an order with the J. H. Horne & Sons Company for a 120 inch fourdrinier machine, to be designed and built according to plans and specifications prepared by W. M. Loveland, president; Clarence Thorne, superintendent and B. M. Baxter of Grand Rapids and Cleveland, consulting engineer.

The machine will be designed particularly for the manufacture of raw coating stock and capable of running up a maximum speed of 700 feet a minute, making it one of the fastest machines of the kind now in use. Among the features embodied will be a 75 foot wire for the wet end, with three sets of presses and a smoothing press. There will be a battery of 29 dryers, 48 inches in diameter and four 36 inch felt dryers, also two supercalender stacks, one of eight rolls and one of ten rolls. In addition there will be a two drum reel and a double drum winder. The machine will have a worm gear drive.

In connection with the erection of the new machine, it is planned to rebuild the wet end and drive of the present 136 inch machine, greatly increasing the length of the wire. It will be necessary to do a great deal of construction work in the machine room erecting new piers for the second machine and putting on a steel roof, thus making this section of the mill fire proof.

Other improvements planned at the mill include extensive repairs, alterations and enlargements to the boiler and engine rooms, also the erection of an addition, 100 by 100 feet in dimensions at the north end of the coating division.

None of the auxiliary machinery that goes with the installation of the new machine has been ordered as yet. This equipment will include a modern type conversion plant. All the work at hand will be undertaken under the supervision of B. M. Baxter.

"With the installation of the new machine our daily output of paper will be increased from 25 to 75 tons a day," said Charles B. Hays, vice-president of the Watervliet Paper Company. "It will enable us to manufacture enough raw stock to supply our coating division. We will also be in a position to produce supplies of machine finished, supercalendered and off set papers."

KALAMAZOO PAPER CO. INSTALLS MACHINE

The Kalamazoo Paper Company, Kalamazoo, Mich., is now completing the installation of the latest addition to its equipment, a 168-inch Rice, Barton and Fales fourdrinier, which will make in excess of 50 tons of book paper daily. The addition of this machine, the largest single unit in the Kalamazoo valley, has made it necessary to practically rebuild mill No. 3 of that concern, install an immense amount of additional equipment and erect a large stock house.

Paper Board Will Establish New High Record

Total Production for 1925, Will, It Is Believed, Be In Excess of the Forecast Made Early In the year. Expansion and Increased Efficiency Have Added To Capacity for Production More Largely Than Seems Warranted by Consumption. Paper Board Industries Association With Paper Board, Container and Folding Box Divisions Formed During the Year—Outlook for Continued Activity During Year.

Written Especially for the Annual Number of the Paper Trade Journal by Grafton Whiting, Statistician of the Paper Board Industries Association

During 1925 the increasing expansion of the paper board and paper board products industry was again emphasized. When the figures from all sources are accumulated, the totals will be found to be in excess of the forecast made early in the year, and will establish a new high record.

The importance of paper board in this country's paper industry is not usually recognized. Few stop to consider that it represents nearly 30 per cent of the total paper tonnage and that it has further claim on popular interest because some 70 per cent of the raw materials used in its manufacture consist of waste material which otherwise would be worthless.

Paper Board Industries Association

As is common in many large industries, the progressive mill owners and fabricators of paper board products have banded themselves together in a trade association for the general advancement of the best interests of the industry. The Paper Board Industries Association, recently formed by a consolidation of three former associations, counts among those contributing to its success, a tonnage volume of over 70 per cent of the total production of the industry. This volume of production scattered as it is throughout the country makes the association truly representative of the industry and permits it to perform a service far reaching in its effect. Not only are the statistics of the industry collected and disseminated to its members and to the public, but the use of paper board products is being scientifically and practically developed through experts trained in this field of endeavor. Standardization of product through laboratory analyses and through investigations of the requirements of users is constantly being pursued.

A program of education is being conducted for a better understanding of business conditions throughout the country and in the paper board industry. By special service, cost-finding in the individual member's plant is being taught. Through these endeavors stabilization is gradually taking the place of erratic fluctuation which is the first sign that a young and growing industry is finding its place among the older and better established businesses. As in many other industries, there is today a capacity for production in excess of demand for paper board; and although the year 1925 called for a greater volume than previous years, the average activity in plants fabricating paper products for general consumption ran less than 78 per cent of the possible running time. Speeding up of machines, improvements in methods, and increased efficiency of operators have added to capacity more rapidly than consumption would warrant. Without this condition an upturn in prices would be a natural sequence of increased demand, but during the past year competition urged on by over-capacity has been such that while month by month fluctuations have occurred, only a small change in average prices took place. Comparison with other price indexes of general commodities shows that this condition prevailed in general throughout the year.

The paper board industry is seasonal, with months of activity in the late winter and early spring, a dull period in the summer, and heavy requirements in the fall. During year-end months production is at its lowest ebb (see Exhibit 1.) With these conditions dictated by the consumers of the product, facilities must be available to meet the peak load in the fall, even at the expense of idle equipment at other times of the year. This partly explains the cause of the low average running time of this industry as contrasted with other manufacturing industries.

Association Composed of Three Divisions

As previously stated, the Paper board Industries Association is composed of three groups, or divisions, namely: Paper board, or paper mill group: Container, or shipping case group; and Folding Box, or carton group. The board mills make the raw materials used in the construction of containers and cartons and, in consequence, are active in advance of the two fabricating groups.

EXHIBIT 1

The chart, Exhibit 1, gives a gives a graphic presentation by months of the activity in a normal or average year for each of the

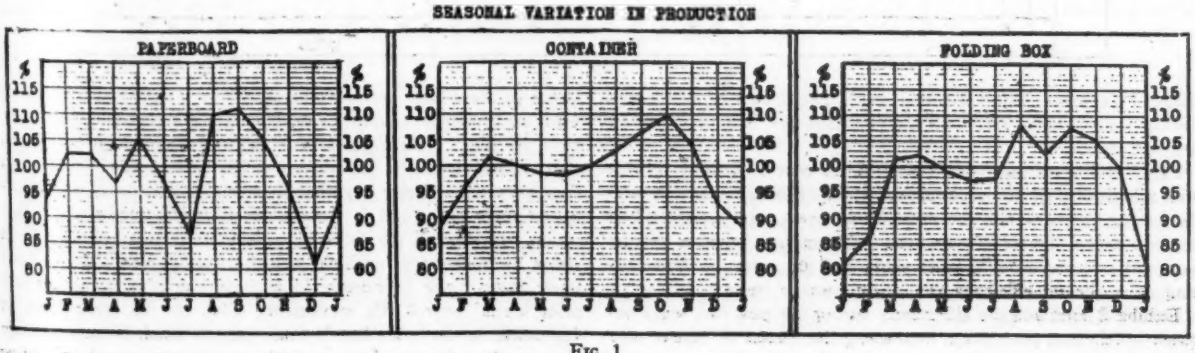


FIG. 1

month in advance of the other two groups, and that more irregularity exists in its monthly swings. This presents one of the problems upon which the association is at work and is of importance because economy of operation in a paper mill depends largely on continuous, uninterrupted running.

Mill Production

The nature of the operation in paper making is such that the stoppage of the processing from the beaters to the finished product entails a considerable loss in tonnage output. Normal speed and quality is not gained for some time after starting up and with a large investment in plant and equipment, such a loss mounts quickly into many dollars. Therefore mills endeavor to run continuously for 24 hours a day with but one shut-down over the week end. With a satisfactory supply of orders ahead this can be done and operations conducted with a minimum of cost. The price of raw materials to the fabricators of boxes is seriously affected by irregularities in mill running. This in turn means an increase in the price of boxes to the users and, eventually, to the purchasers of the thousands of articles shipped in boxes.

An Operating Budget for 1926

As a means towards correcting this situation, a budget of operations for 1926 has been prepared by forecasting totals of production month by month. Using this as a guide, needs may be anticipated during dull periods and tonnage provided for use in times of heaviest demand.

Paper mill operating time showed 92 per cent of activity in 1924 with a high of over 100 per cent and a low of 78 per cent. In 1925 the average activity was the same 92 per cent, with a high of 98 per cent and a low of 79 per cent. Fluctuations between months were not so great as in former years, and the more uniform running gave greater efficiency and larger tonnage output.

Exhibit 2, contrasts the differences during the past two years between orders and production, expressing the excess of orders over production as plus (+) figures above the horizontal line, and production gained over orders as a minus (—) figure below the line. This chart shows the improvement in 1925 over 1924 in that gains and losses were less marked than previously.

Board Prices

In dealing with price levels over a period of months and years, difficulty is encountered from the fact that different sections of the country have varying levels, due to their distances from the main supply of raw materials and freight rates. A further factor of quantity enters into negotiations for which it is difficult to compensate. The figures shown in Exhibit 3, are averages of prices per ton delivered, accumulated from a large number of transactions of varying quantities, both east and west. During 1924, Liners—85 Test—averaged $64. per ton, with a low of $58. in June and a high of $72. in December. 1925 has an average of $69.50 with a high of $74.50 in February and a low of $64.50 in May. Sales were made as high as $77.50 and as low as $55.00, but in not sufficient volume to be recorded as an average for the period charted. The price levels of .009 caliper straw and non-test chip (.016 caliper) are charted together on Exhibit 4, and are shown per ton delivered. Straw (middle west delivery) has maintained an average level of $55. for the two-year period, dropping in the summer of 1924 and advancing in the fall. For 1925 there was an advance in the winter and a dropping off in the summer. Chip has held an irregular course more fluctuating in 1925 than in the previous year. The differences in price movements of straw and chip are largely due to the sources of the raw material from which they are made. Straw is gathered from the farmers as a by-product of their crops and is for the most part a once-a-year transaction. In the fall the straw mills accumulate huge piles of baled straw for their needs until the next harvest is over. The farmers stack some straw in reserve in anticipation of later baling and price levels control this movement. Chip on the other hand, is dependent on the collection of waste papers which is very sensitive to price fluctuations. Severe weather conditions retard collections

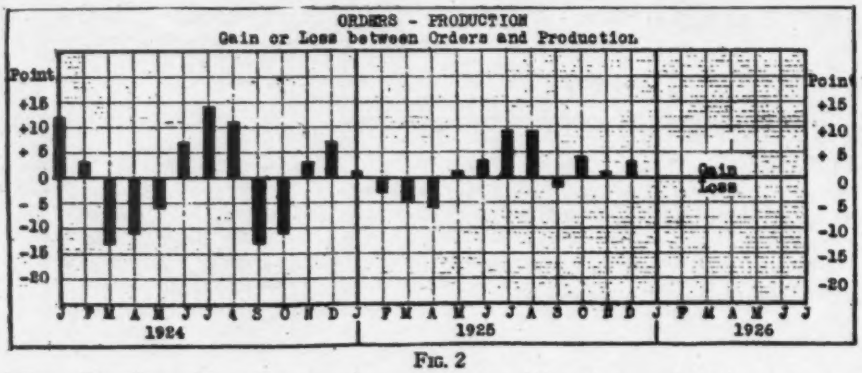


FIG. 2

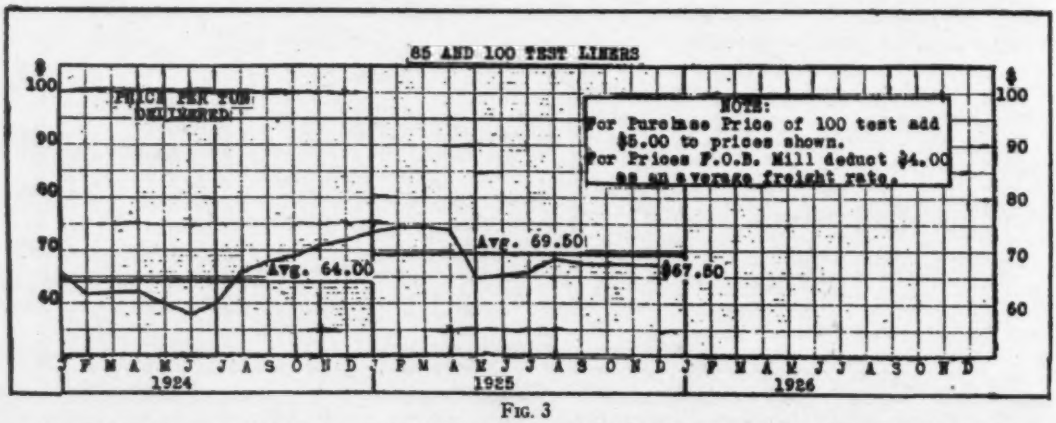


FIG. 3

and on the other hand, spring cleaning increases it very rapidly. Add to this the seasonal demand by the mills, and a complicated situation is to be expected.

Container Production

The price movement of straw and chip is of interest to the container manufacturers—the largest users—because one enters into the construction of corrugated containers while the other is the principal material in the construction of solid fibre boxes.

It requires 60 pounds of straw to make 1,000 square feet of corrugated board, while in solid fiber from 90 to 240 pounds (depending on the thickness) of chip is the average requirement for the same area. The price of a box when sold is based primarily on the size or area of the sheet from which it is cut and in consequence a comparison of board costs by area is justified. The price level of chip affects solid fiber board to a greater extent than straw in corrugated, because of the greater weight of the former in a given 1,000 square feet.

Many kinds of commodities can be shipped in either type of boxes and the price will generally dictate which will be given the preference in ordering. Another factor that enters into the relative demand for corrugated and solid fiber containers is the seasonal character of some of the articles shipped; those particularly adapted to corrugated (such as glassware, bottled liquids, etc.) come into the market more strongly at certain times of the year, while solid fiber containers (those used for shoes, certain food products, etc.) have their active seasons.

Exhibit 5, compares the activity of corrugated and solid fiber running time and gives the relative activity by months. In 1924, the falling off in the summer period was severe particularly for solid fiber. In 1925, a more stabilized condition existed with a decided upturn in corrugated during the busy fall months.

So great was the demand during October and November that a shortage of certain sizes and kinds of raw materials was experienced, and there was emphasized the need for establishing a budget of requirements so that more forethought in the future would be exercised in placing specifications for purchases.

Container Prices

The price levels for finished containers as before mentioned, have not had any violent changes. 1924 opened at an average level, dropped during the summer period, and advanced over the year-end. This advance held until June, 1925, and August saw the low point which was, however, above the low of the previous year. An improvement took place during the fall which was held to date.

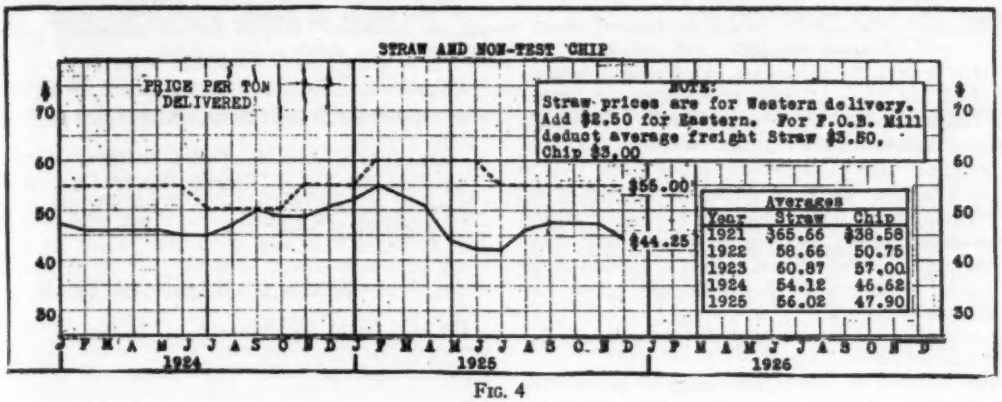


FIG. 4

As a general rule container prices follow the board market but lag behind on the upturns. With a softening of board prices containers drop more quickly, bearing out the old theory that it is easier to drop prices than to advance them.

The practice of quoting prices based strictly on replacement or current market prices of raw materials is gradually becoming customary. Container manufacturers as in other lines are beginning to realize that if prices are dropped with the lowering of board market levels, they should be increased simultaneously with advancing board prices. Any divergence from this parallel entails a loss when the cycle of ups and downs is completed.

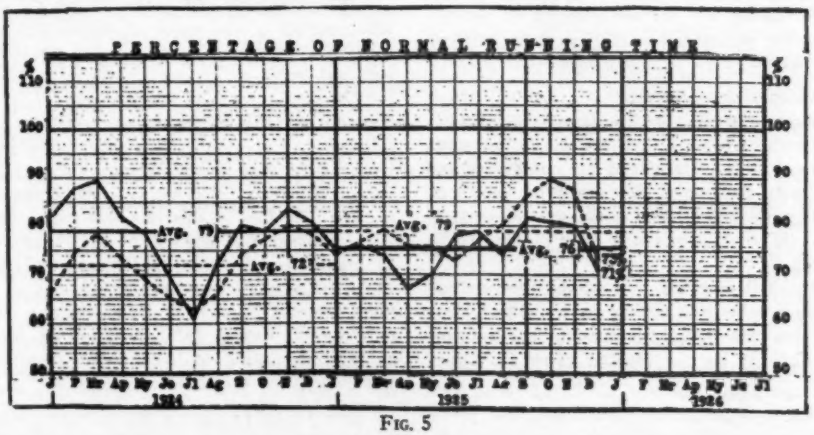


FIG. 5

Folding Boxes

In the folding box group of the industry the year 1925 was marked by a satisfactory volume of orders but with no corresponding advance in prices. The tendency on the part of buyers to place smaller orders at more frequent intervals has been a hardship, since the preparation or make-ready is a large item in the cost of each job in the folding box plant. Such profits as

have accrued were due to the increased volume which has reduced the proportionate charge of the overhead of each order.

The feeling of extreme caution which marked the policy of buyers in 1925 and led them to hand-to-mouth purchases, has added to their costs. Quantity discounts have been sacrificed to maintain low inventories. With the coming year more confidence will be felt and while caution still remains there is already in evidence more willingness to enter into longer term contracts. Such a change will benefit the folding box manufacturer, enable him to schedule his purchases and work further in advance and maintain a more even employment of his labor.

Forecast for 1926

Much has been written by economists about general business conditions to come and many of these forecasts are of interest to the paper board industry because almost every article made, has to be shipped somewhere and for this movement has to be packed and protected. The buying power of the public dictates the demand as a whole. Of more immediate concern is the anticipated activity of those trades which are the largest regular users of containers and cartons, and then the special manufacturer with his seasonal demands. The forecast of the car loadings on the railroads is another indicator of the rapidity with which containers will be put into use.

A summary of the various indexes in their bearing upon paper board demand may be stated as follows:

The prospects for 1926 are for a continuance of activity for the first quarter with the usual recession in the late spring and early summer. The last half of the year while depending upon the general business conditions, and the success of the farmers in disposing of their crops, should witness an upturn not as great as in 1925 but of substantial proportions. The volume as a whole, including normal growth, is forecast at 5 to 7 per cent increase. Production facilities will increase during the year in ample proportions to take care of the demand. In fact, plans now under way in a number of plants for the replacement of old equipment by new and faster moving machinery indicate that the desire for increased efficiency in operating and for the lowering of production costs has dictated the policy rather than a strict analysis of the increase in demand that may be anticipated.

Association Activities

The sales promotion activities of the Association are directly towards creating wider uses of paper board products in industries scattered throughout the country. The effects are cumulative and the increased demand during the fall of 1925 was in no small part due to the intelligence with which this work was prosecuted. With recent additions to the association's staff even greater results are in prospect for 1926.

The gathering of statistics is practical only through the medium of an association and their value in assisting the individual plant executive to shape his business policy has brought the industry forward, and will continue to have a marked effect on future growth and stabilization.

Many subjects of importance to the industry are docketed for action in the coming year by trade associations in various branches of manufacture, by the regulatory bodies of the railroads and by the Department of Commerce, in all of which the Paper Board Industries Association is recognized as the mouth-piece of the industry.

All of these activities are made possible by united and cooperative effort and the Paper Board Industries Association deserves the enthusiastic support of every producer of paper board commodities.

In the words of George Washington, written on March 31, 1776:

> "It is not sufficient for a man to be a passive friend and well-wisher to the cause. Every person should be active in some department, without paying too much attention to private interests.
>
> "Inactivity in some, disaffection in others, timidity in many, may hurt our cause. Nothing else can, for unanimity will carry us through triumphantly if we are linked together in one indissoluble band."

FINLAND HAS FAIR YEAR

The position of the pulp and paper industries of Finland on the whole was very satisfactory at the end of last year, according to reports received by the Paper Division of the Department of Commerce.

Commenting on the year in Finland in the industry the reports continue:

Exports in most lines were heavier than in the preceding year, and contracts had been placed covering a considerable portion of the 1926 output of chemical pulp and news print. The domestic market for both chemical and mechanical pulp was firm and prices showed a distinct upward trend. The paper market at the end of the year also was active with stable prices and a good demand was looked for in view of the shortage of mechanical pulp.

Exports of pulp and paper during the first eleven months of 1925 reached a total value of $35,800,000, an increase of 17 per cent over the same period in the preceding year. Exports of chemical pulp, which were valued at $15,260,000, consisted of 200,228 metric tons of sulphite and 71,822 tons of sulphate, an increase of approximately 10 per cent in quantity over the 1924 shipments. Exports of mechanical groundwood, however, dropped from 42,453 tons to 70,575 tons during this period, a reduction owing largely to the more lively demand from the domestic market. The loss in this line was more than offset by the additional shipments of news print and boards, exports of the former having increased from 122,752 tons in 1924 to 139,797 tons in 1925, and of the latter from 28,452 tons to 47,644 tons during the same period. Exports of coarse brown wrapping were about a third larger than in 1924, the total for the eleven month period in 1925 amounting to 9,051 tons. Exports of other classes of wrapping paper decreased slightly.

PANORAMIC VIEW OF NEW RIVER BEND MILL OF PRICE BROS. & CO.

Year in Coarse Paper Slightly More Satisfactory

Keen Competition Marked the Early Months of the Year But With the Broader Resumption of Industrial Activity in the Closing Quarter Prices Steadied and Rose to Levels That Allowed Fairer Margins of Profit—Cost of Doing Business Continues an Important Problem That Must Be Solved More Satisfactorily Than at Present Before Paper Men Can Expect Any Adequate Profits.

Written Especially for the Annual Number of the Paper Trade Journal by Simon Walter, Vice Pres., Philadelphia Paper Trade Association and Pres., S. Walter, Inc., Philadelphia.

Coarse paper distribution throughout 1925 was not marked by any radical departure from the customary trading in these grades of paper. Although the market followed its normal course there were certain conditions which might prove factors for future developments either in the coming year or in those to come after. But these conditions while affecting the local industry have their foundations in the manufacturing branches of the paper trade rather than in the immediate distribution division and so must be left to their originating sources for explanation or constructive action in the future. While here in Philadelphia the coarse paper market pursued its normal course throughout the year it was marked by keenness in competition for the staple lines. This competition in the early months of the year left its impressions in the lowering of values. With the broader resumption of industrial activities in the fall, however, prices steadied and rose to levels that gave opportunity for fairer margins of profit in the closing quarter.

Steadying Influences

While confidence was restored with the more active fall months there was another factor which played a most important part in bringing business and prices to a steadier and firmer foundation. It was the effectiveness of Association work. In the earlier days of the year when prices were lowered the dealers were made to see the foolishness of conducting their business along unprofitable lines, through the activities of the Philadelphia Paper Trade Association which brought about a better understanding among distributors and so stabilized the market. The Association activities were effective in stabilizing the market and promoting a steadier tone but there is still room for improvement. However the support of the membership in cooperating with the organization is worthy of commendation.

Though the coarse paper market has been adjusted to the requirements of a normal period, the cost of conducting business has not become more satisfactory. And so, the greatest problem of all houses just now is overhead. This problem will continue unsolved just so long as living conditions remain as they are—and they apparently show no signs of receding. Concerns will best profit who give proper consideration to the thorough study of the costs of doing business and exercise the courage to apply a mark up that is consistent with a just profit.

The entire year was, in comparison with 1924, a trifle better There is nothing in sight at the moment to presage disturbance of the present conditions and the constant preaching of caution that we hear on all sides will go a long way towards steadying conditions in the current year.

Kraft Problems of the Past Year

While foreign krafts were eliminated during the past year as a factor in this market and apparently have disappeared as an issue of consequence to the local distributors the Southern product has become an important feature of the coarse paper market. In early 1925 some of these Southern krafts came into the market at ridiculously low prices. In the fall months, however, krafts became steadier and are now maintaining the quotations of the late year.

Wrapping Tissues Stabilized

As in the kraft market of early 1925 the wrapping tissues were subjected to conflicting and uncertain changes that had a tendency to weaken these grades and to unsettle conditions. As the year waned there was a tendency to firmer prices due to the strengthening of the sulphite market. Higher prices abroad for sulphites stabilized the American goods. Broadening of demand further added to the strength of these wrappings.

Paper Bags Continue an Unsolved Problem

The paper bag situation seems almost indescribably hopeless. About the middle of the year when conditions seemed to be improving in this branch of the industry and efforts were made to more stabilized distribution of bags, the plan collapsed and the results from these efforts were really more injurious than helpful. In some quarters there is a belief that conditions will shortly improve. While we all like to feel optimistic I fear that in this case the wish is father to the thought. These unsettled conditions make for anything but a normal market.

Colored Wrappings Favored

There has been a marked tendency the last few years towards colored specialties for wrapping purposes, on account of their distinctiveness. This appears to have grown year by year and with the advent of kraft, manila wrappings seem to have been eliminated. In the cycle of events, possibly, there may be a recurrence to manila, but the year's sales were chiefly in the krafts and colored wrapping.

THE INDUSTRIAL EXECUTIVE

Published by the Ronald Press Company, of New York, "The Industrial Executive," by B. A. Franklin, vice-president of the Strathmore Paper Company, is a successful attempt to consider industry as a whole—its purpose, its economies, its economics, and its ideals. This valuable volume should inspire thought, study, experiment and action.

Two main ideas are presented by the author. One has to do with industrial executives, principals, and subordinates, in whose hands rest very largely the highest development of industry. The main elements of the constantly perplexing problems of the ordinary executive are reviewed and the underlying principles and most important essentials of his work carefully analyzed.

Idealism is the second idea discussed by the author. He brings out in an illuminating manner the fundamental fact that American industry has for its sole reason for existence—service. There is the service to the world through the production of articles for use and consumption in a universally increasing standard of living, and there is the service of industrial units as service centers to those employed and co-operating in them.

These conditions create necessities which must be met if industry is to render to the maximum what it must render to the minimum to exist—a real service. One necessity is that it shall be operated profitably, and the other is that it shall be the means of creating men and women of character, ability, usefulness and independence.

Wood Pulp Industry Enjoys Remarkable Year

Tonnage Produced and Delivered During 1925 Reaches Record Dimensions—Market Began to Expand in February and Gradually Developed Unusual Strength—Favorable Shipping Conditions in the Baltic Led to Unexpected Business—Increased Tonnage of Bleached Sulphite Used for Rayon Proved Important Factor in the Market—Wood Pulp Imported Into the United States Is Larger Than Ever Before.

Written Especially for the Annual Number of the Paper Trade Journal by O. F. Swanson, Sales Manager of Andersen & Co., and The Pulp and Paper Trading Co.

Again the curtain on the last act of another year's activity has been lowered and to the wood pulp manufacturers it fell on a happy scene, because the year 1925 was in many respects a record one and especially so as regards the tonnage produced and delivered during the year of this most important of all raw materials in modern papermaking—wood pulp—of which there are two distinct grades: mechanical wood pulp and chemical wood-pulp of which latter there are three grades, soda pulp, sulphite pulp and sulphate or kraft pulp. Mechanical wood pulp, generally known in the trade as groundwood, constitutes about 80 per-cent of the ingredients of newsprint of which millions of tons are manufactured annually. It is also used to some extent in other grades of paper and in board. This grade is clearly described by its name, it is a mechanically ground wood product. Chemical pulp is produced by cooking the wood in chemical solutions and is not ground. On account of its comparatively strong fiber and variety of grades, it is used in almost every kind of paper and board. Bleached soda pulp is largely an American product, and is most commonly used in a variety of both colored and white papers, such as book papers, etc. The method of manufacturing sulphate or kraft pulp and soda pulp is quite similar to the one used in making sulphite pulp, but instead of an acid solution an alkaline solution is used. Bleached sulphate is used in the higher grades of paper.

Sulphite Pulp Widely Used

Sulphite pulp, both unbleached and bleached, is, because of its several grades, most extensively used throughout the world. When bleached it is the whitest and cleanest of all wood pulp, and for that reason is a very suitable mixture with rag stock both unbleached and bleached in the manufacture of the finer grades of papers and boards. A very handsome sheet of both white and colored paper is also made from either 100 per cent bleached sulphite pulp or from a mixture of this and other grades of wood pulp of high quality or reclaimed, bleached paper stock, but such paper is usually inferior in strength and durability to paper made either entirely or partly from one of the first raw materials for papermaking—rag stock.

On account of the space being limited, a comprehensive account of the history of wood pulp will not be given in this article nor detailed or technical description of its several processes. It is, however, an interesting fact and which perhaps is not generally known to the consumers of wood pulp that according to available records an American chemist, B. C. Tilghman, was one of the first, if not the first, to discover a process for manufacturing chemical wood pulp by cooking wood with a solution of bi-sulphite of calcium or other bases, and that he was granted a U. S. patent on this process in 1867. It was reported that he was experimenting with fats and found when using sulphurous acid (SO_2) that the solution attacked the wooden vessels containing the mixture, which seems to indicate that this valuable discovery like many inventions was accidenal. About the same time that Tilghman made this discovery, E. D. Ekman of Bergvik, Sweden, was experimenting with cooking wood with magnesium bi-sulphite solutions, and as he was more successful than Tilghman who died a poor man after having spent all his money trying to perfect his process and actually produced about 100 tons sulphite pulp per month, he is by many considered the father of the chemical wood pulp industry, which has now attained an enormous size and instead of a production of about 100 tons per day as in 1874, the tonnage manufactured today runs into millions of tons annually.

Spruce Most Suitable Wood

In case of need almost any kind of wood can be used, but spruce is considered the most suitable—hence the better grades of both mechanical and chemical wood pulp are being made from 100 per cent spruce or as close to this as possible. The bark of the spruce log is removed in the wood-room of the sulphite mill, which if modern, is equipped with labor and time saving machinery, such as automatic slasher saws, barking drums, conveyors, splitters and high efficiency chippers cutting up the wood into chips at the rate of about one cord every four minutes. Following this, the chips are usually screened and automatically placed in the digesters where these chips are mixed with an acid solution. The typical form of digesters in the modern sulphite mill is a tall, upright, cylindrical vessel of steel construction with a dome shaped top, a conical bottom, and varying in size some of which being 15 feet in diameter, about 50 feet high and hold approximately 25 cords of chipped wood and about 28,000 gallons of acid, or a capacity of about 13 tons of dry sulphite pulp. When the digester has been filled with chips and acid, the cover is securely bolted on, the steam valve is opened and the cooking then commences. The steam pressure is allowed to increase gradually to about 70 pounds and the time of actual cooking ranges all the way from about 8 to 70 hours, depending on the quality of pulp desired and the system of cooking used. During this time, the acid liquid, together with the high steam pressure and immense heat, dissolves and removes practically all the constituents of the wood chips except the cellulose which constitutes the sulphite pulp. When bleached, this pulp constitutes almost pure cellulose or the fiber from which all grades of paper are made, as well as artificial silk and a number of other commodities.

Favorable Shipping Conditions

After enjoying considerable activity during December, 1924, chemical pulp struck a short quiet period after the holidays, but signs of improvement were noticed as early as February, 1925, and the business during the first half of the year was described as satisfactory. The outstanding feature during that period was the mild winter in the northern countries of Europe—navigation in the Baltic being continued for several weeks longer than ever before, enabled the Swedish pulp mills located on the east coast of Sweden to make shipments when during the same period of previous years the pulp was stored at shipping points until the opening of the Baltic navigation in the spring—usually in May. Owing to the late closing and early opening of the Baltic navigation, a fair amount of unexpected and generally satisfactory business was transacted in Swedish pulp, both in the U.S.A. and Europe.

European buyers, and especially those to a great extent de-

pendent on their wood pulp supply from the Austrian, Czecho-Slovakian and German pulp mills, realizing quite early in the year that the prospects of securing their usual tonnage from these countries were very remote, placed larger orders with Scandinavian and Finnish pulp mills than usual, and England in particular was a heavy buyer and not only covered her requirements over the balance of the year, but also for the first half of 1926 and to some extent for the last half. Owing to the fact that Austrian, Czecho-Slovakian and German pulp was sold in the home market at prices about $5. per ton higher than obtainable in other markets, the export of pulp from these countries was greatly curtailed and Germany, one of the largest pulp producing countries in Europe, bought pulp for home use in Sweden, Norway and other countries.

Other Favorable Influences

Pre-deliveries against contracts for shipment commencing with opening of Baltic navigation were also made so that the tonnage originally intended for shipment in May was greatly reduced and a certain percentage of same had already been converted into paper and board by that time. This in itself had a stimulating effect on the market which, instead of weakening, upon the arrival of Swedish and Finnish shipments in May and June, as is usually the case, held firm both as to demand and prices which, as a matter of fact, were higher in the month of June on almost all grades than in any of the previous months of the year. Large sales of all kinds of imported chemical pulp, of which kraft pulp occupied the strongest position, for deliveries during the last half of the year and also for monthly shipments over 1926, were made during March, April, May and June, which indicated a more stabilized business both in Europe and on this continent, as well as increased confidence in the future on the part of the consumers who, for several years prior to 1925, did not feel warranted in closing contracts that far ahead. This change of conditions was considered so favorable to the industry at large that several buyers saw in same another step toward a return of normal conditions in Europe and, therefore, gained sufficient confidence in the future not only to cover their requirements for the last half of the year, but also partially for the entire year of 1926. By placing their orders early, they were able to secure their favorite brands and at somewhat lower prices than almost any brand brought later in the year.

Demand for Artificial Silk

Another quite important reason for the ready sales of chemical wood pulp was the increased tonnage of bleached sulphite used in the manufacture of artificial silk, or Rayon, of which the main processes are the Viscose, the acetate cellulose (celanese), the collodion and copper-oxide-ammonium processes, and of which commodity the world's consumption has increased tremendously during the last few years. It probably would be impossible to obtain accurate statistics concerning the production of artificial silk in the past years, but it is estimated that the entire production during 1913 was about 20 million pounds, of which about 6 million pounds were made in the United States. In 1920, the production had increased to about 55 million pounds of which about one-third was produced in the United States. Practically the entire production in this country until then was made by the Viscose process. During the year 1923, the estimated world's production was close to one hundred million pounds which increased to about 145 million pounds in 1924, and to about 175 million pounds in 1925, during which year it is estimated that the production of artificial silk in the United States was about 45 million pounds and of which about 80 per cent was produced by the Viscose process. There are no available figures as to the exact tonnage of bleached sulphite consumed during 1925 in the manufacture of artificial silk, but as it is understood that cellulose constitutes the main raw material used in the manufacture of same, it is possible that the tonnage of bleached sulphite used for this purpose during 1925 was at least 75,000 tons. If this estimate is approximately correct, and taking the rapid growth of the artificial silk industry during the last few years into consideration and the possibilities of its further expansion, it is reasonable to assume that a considerably larger tonnage of bleached sulphite pulp than required at the present will be used within the near future for this wonderful commodity, as well as for artificial wool which, although still in its infancy, is reported to be some healthy baby and in size might eventually overtake and pass its more lustrous predecessor.

Yellow Pine and Other Woods for Pulp

With the continued growth of the pulp and paper industry throughout the world and the increased demand for all kinds of wood pulp for commodities outside of the paper business, of which artificial silk or rayon is probably the largest consumer, the attention of the engineers and chemists in the trade has been attracted to the importance of utilizing not only the best spruce for wood fibre, but yellow pine, hemlock and gum wood as well. Research work on a large scale concerning the possibilities of utilizing the bark, sawdust, logging operation waste, the greater part of which consists of limbs and pine needles, has been done, and it is hoped that eventually such materials can also be successfully converted into paper and board. At the present time, yellow pine is being extensively and profitably used in the manu-

IMPORTATION OF WOODPULP TO U. S. A.

Quantity in tons of 2,240 lb. and value f. o. b. shipping points in millions of dollars.

	1923		1924		1925		Increase or decrease in percentage on tonnage			
	Tons	Value	Tons	Value	Tons	Value	1923-24	1924-25	1923-25	Average
Sulphite:										
Bleached	250,580	22.25	272,369	21.1	286,976	22.53	+ 8.7%	+ 5.3%	+14.5%	+ 7.2 %
Unbleached	461,853	26.55	561,920	30.08	579,284	31.54	+21.7%	+ 3.1%	+25.4%	+12.7 %
Sulphate:										
Unbleached	249,118	16.31	305,707	17.47	323,492	19.25	+22.7%	+ 5.8%	+30.0%	+15.0 %
	961,551	65.11	1,139,996	68.56	1,189,752	73.32	+18.1%	+ 4.4%	+23.7%	+11.85%
Ground wood	267,927	9.30	219,571	7.19	295,618	8.52	—18.0%	+34.6%	+10.3%	+ 5.2 %
	1,229,478	74.41	1,359,567	75.75	1,485,370	81.84	+10.6%	+ 9.3%	+20.8%	+10.4 %

Taking for granted values, f. o. b. pulp mills, declared in Consular Invoices are correct, the comparison between the various years will be as follows; based on average prices:

	1923		1924		1925	
	Per 2,000 lb.	Per lb.	Per 2,000 lb.	Per lb.	Per 2,000 lb.	Per lb.
Sulphite:						
Bleached	$79.28	3.96c	$68.87	3.44c	$70.10	3.50c
Unbleached	57.49	2.87c	47.80	2.39c	48.61	2.43c
Sulphate:						
Unbleached	58.46	2.92c	51.02	2.55c	53.13	2.66c
	$60.46	3.02c	$53.70	2.69c	$55.02	2.75
Ground wood	30.99		29.24		25.73	

facture of several grades of paper and board in the Southern States, but it is expected that the time will come when also news print, book and writing paper of high quality will be manufactured from this wood mixed with gum wood or possibly from gum wood alone, of which there is an abundant growth in several sections of the South.

Of all the Southern States, Louisiana has made the most rapid progress in pulp and paper making during the last few years, and probably will be the center of the wrapping paper industry eventually, providing she takes care of her forests. It is interesting to note that at the present there is a daily production of about 360 tons of kraft paper in this state which is about one-sixth of the total daily production of kraft paper in the United States, and if taken into consideration that the sulphate process of pulping wood in Louisiana really did not operate successfully before 1912, her present production of kraft pulp and kraft paper speaks for itself as to what can be expected from this industry in the South. It is estimated that about 15 million cords of pulp wood per year which, for the entire country, represents a clear cut of about one million acres is being consumed, and with this tremendous consumption today and also with the possibilities of a vastly greater consumption within the near future, it is estimated that the yellow pine in Louisiana will be depleted within twenty years unless strenuous efforts are made to assist in the regrowth. It is obvious that particular attention should be paid to the reforestration and the careful management of the forests, and it would seem that the conditions in the Southern States should be fully as favorable to reforestration as, for instance, conditions in Norway, Sweden, Germany and other countries.

Record Imports

The tonnage of wood pulp imported into the United States during 1925 was larger than ever before and the average price higher than during 1924. The figures below should explain more clearly than words what has actually taken place with reference to the tonnage imported to the United States during 1923, 1924 and 1925, and indicate that the pulp market was in a very satisfactory condition during 1925.

Another important reason for this unusual condition was the absence of the customary price fluctuations. There was neither feast nor famine, but a comparatively steady demand throughout the year with gradually rising prices, but only to a point where "Live and Let Live" could be applied and not further. At the beginning of the year, in July and to the end of 1925, contracts were closed at the following prices per lb. of air dry fibre, ex-dock usual Atlantic ports and f. o. b. cars American and Canadian Pulp Mills:

	January, 1925	July, 1925	December, 1925
Sulphite:			
Bleached	3.45— 4.50c	3.75— 4.50c	4.00— 4.75c
Easy bleaching	2.90— 3.25c	2.90— 3.25c	3.20— 3.60c
Strong unbleached	2.75— 3.75c	2.55— 3.75c	2.90— 3.50c
Sulphate:			
Kraft pulp	2.70— 3.50c	2.75— 3.25c	3.00— 3.25c
Ground wood	$38.00—40.00	$28.00—37.00	$28.00—42.00

Prices on sulphite and sulphate per lb., and on ground wood per ton of 2,000 lb.

Booking Orders for 1927

The rather early buying in England for 1926 and the business-like manner of both buyers and sellers during the entire year made a favorable impression in the trade, and its effect was not only felt in the countries the purchases were made, but also in this country, and the spirit of cooperation was more noticeable throughout the trade than for several years past. At the present time, the Scandinavian and Finnish pulp mills are booking orders for deliveries in 1927 and important contracts have been closed at about last year's contract prices. It has been reported that Sweden alone has sold about 200,000 of sulphite and Kraft pulp and that Norway and Finland have also accepted large orders for shipment during 1927.

Now since the pulp consumers and pulp producers have evidently come to the conclusion that cooperation is the keynote to success, it reminds me of the creed of a real gentleman and old paper maker, "courtesy, confidence, cooperation"—Great Stuff, ye peddlers, *et al.*, to possess—so why not pass the idea along so that the spirit of "Live and Let the Paper Maker Live" may not be annihilated in beaters, but will still be alive and noticeable after the pulp has been converted into Board and Paper.

UNION BAG TO MAKE NEW CONTAINER

The Union Bag and Paper Corporation, in collaboration with Marshall Field & Co., of Chicago, has evolved a new container, known as the "box bag," on which Marshall Field has conducted extensive and favorable experiments as to practicality, and production on a large scale will be started about March 1.

The container is a simple one, consisting of a heavy kraft paper which is placed in a special metal form. Articles to be wrapped are placed therein and protected by excelsior or other suitable packing material. The "box-bag" is then sealed, removed from the mold, and makes a tight, compact package, protecting the articles from breakage under any conditions.

An exclusive contract has been closed with the American Can Company to supply the metal molds. Marshall Field and Union Bag together hold patents on the container and this packing method, while the latter has perfected and patented the necessary machinery for its production.

Designed to reduce packing and shipping expenses Union Bag's new product has been tested thoroughly in the Chicago retail department store of Marshall Field & Co. Cost of the average package by the new process has been reduced between 50 per cent and 75 per cent in various cases. Not only does the "box-bag" permit saving in packing and shipping expenses over the clumsier and more expensive containers and wrappers now in general use, but considerably less space is required for its storage. This last factor is, of course, an important one to department stores.

Department stores throughout the country have been making inquiries for the new product. It has been tested for every form of merchandise, including the most fragile glassware, and in every case has filled the bill and saved expense. Large shippers, such as the mail order houses, manufacturers, etc., are interested in the innovation and important contracts may be closed. One of the largest electrical manufacturing companies has approached Union Bag with the idea of shipping electric light bulbs and other electrical supplies in this way.

JANUARY NEWS PRINT STATISTICS

Production of news print in the United States during January 1926, according to the News Print Service Bureau, amounted to 140,026 tons and shipments to 139,012 tons. Production in Canada amounted to 139,688 tons and shipments to 136,498 tons making a total United States and Canadian production of 279,714 tons and shipments of 275,510 tons. There were also 13,862 tons of news print made in Newfoundland with 925 tons made in Mexico so that the total North American production in January 1926 was 294,501 tons. The news print mills also made 1,379 tons of hanging paper in January, 94 tons of which were made in Canada.

During January the United States mills operated at 94.6 per cent of rated capacity and the Canadian mills at 96.2 per cent.

The United States mills made 8 per cent more in January 1926 than in January 1925 and the Canadian mills made 15 per cent more than in January 1925.

The combined production of the United States and Canadian mills in January 1926 was 11 per cent more than in January 1925.

Stocks of news print paper at United States mills totaled 16,338 tons at the end of January and at Canadian mills 14,602 tons, making a combined total of 30,940 tons which was equivalent to 2.7 days' average production.

An Unsettled Year in Rags and Paper Stock

1925 Opened Very Promisingly With a Large Volume of Business in Progress—Competition, However, Was Keen and Sales Were Figured in the Terms of Losses Instead of Profits—Outstanding Feature of the Year Was the Easing Off in Rags—Rope Held Firm at High Levels During the First of the Year But at Close Reached Lowest Prices Since 1921—Over-Production of Finished Paper Affects Prices.

Written Especially for the Annual Number of the Paper Trade Journal by Walter R. Hicks of Daniel M. Hicks, Inc., New York.

The most elusive thing I can think of at the present moment, is inspiration. Particularly in connection with a market report. It is as irritating as a golf ball, possesses the agility of a fugitive collar button and the uncanniness of a mother-in-law. It will not even lend its magic influence to a business, as industry is void of romance, dealing solely with the ham and eggs of every day life. But this is an obituary not a story, an assay not an essay, and the dignity of such an article must be maintained or else the serious minded business man would be shocked and irreverence would echo down the corridors of time. The foundation of business is concrete, and although it may be embellished with ivory and mahogany, its purpose is to deal with facts so without further apology, let's view the remains.

Year Started Off Well

1925 started off with a bang and ended in a pompadour; everything gave promise of good business but Dame Fortune is fickle and broke her promise. Volume was good, in fact so dense it permitted but little daylight. Competition was keen, but the competitors were not keen enough. Sales were figured in terms of losses instead of profits, the only satisfaction being in the thought that the transaction only showed a two dollar loss, whereas if you had waited a week longer it might have shown five. Holding on meant falling off, and the longer you held the harder the fall.

Rags, Rags, Rags
All tattered and all torn,
Neglected and forlorn,
Doth Sulphite sound thy doom,
Art waiting for a boom,
Though business omens well,
Thy fate who can foretell
We ask thee, Rags?

Easing Off in Rags

The outstanding feature of the year was the easing off in rags. It was thought in many quarters that if there were anywhere near a normal demand for rags there would be a shortage and an advancing market would result. As roofing is more or less the key to the rag situation, the softening in prices might be attributed to the weakness in this grade. While felt mills were fairly busy on the whole, and demand would ordinarily have continued strong, the roofing manufacturers changed their policy of sales by granting no more datings to saturators. By doing this they were not committed so far ahead on their sales, and its effect was felt in the purchase of rags. Fiber mills then dropped out of the picture and used up their rags on hand, all of which contributed to the coffers of both, with the rag man doing the coffing.

The better grades of rags also declined. This is attributed largely to the call for sulphite papers. Certain it is that the fine mills did not enter the market to any great extent for the purchase of Rags. Mixed rags remained high due largely to the price of woolens, but the packers were compelled to take losses on their cotton bags, and as a consequence the collection of mixed rags has been greatly curtailed, which is bound to have a steadying influence on the market with advancing prices as soon as there is an increasing demand.

Kraft Cuttings at New High Levels

It was thought, when the rag doll was laid aside, for the march of the wooden soldiers, mechanical and chemical, that waste paper would advance in sympathy with pulps. Practically the only grade to respond was kraft papers. Both new cuttings and old kraft soared to new levels, the former selling at almost the same figure as kraft pulp. Soft and Hard white did not fluctuate much maintaining a fairly even level over the year. There was a noticeable falling off in the demand for book stock. Very few mills showed an active interest at any time, and as orders were none too plentiful, the market reached its lowest level since 1921. At no time did mills show any inclination to buy very far ahead, and the demand was just about sufficient to take care of supplies as fast as they accumulated. Toward the end of the year there was a better feeling in book stock, mills coming in for heavier tonnages and under this pressure the market stiffened somewhat holding firm in the opening months of '26. News and mixed suffered more than the other grades, as board mills were not very generous with their offers. This reflected the condition of the board mills who were glad to get orders for board at any old price, and the first of the year there has been a decided improvement in the low grades and the packers look for better business over this year.

Rope and Bagging

Although rope held firm at very high levels over the first half of 1925, the demand fell off through the summer months and rope slumped until prices reached the lowest point since '21. The bag business was good, but the mills substituted other grades in combination with pulp and rope suffered in consequence.

Bagging was the outstanding grade as it was in strong demand all year for both paper making and breaking up. The big cotton crop found the Jute Mills unprepared. These mills had to come into the market heavily, paying almost any price to cover their requirements. The paper manufacturers were compelled to meet these figures which further strengthened the situation, bagging of all grades advanced close to the high levels realized in the boom market of 1920.

Prices Not Maintained

It is a strange coincidence, that in spite of the fact that the volume of business was large, over the year, prices were not maintained on the whole. This is attributed to over-production of finished paper. Increased production means increased consumption yet prices of raw materials over the past year were not as high as the preceding year. We are told that business is now on a more intelligent basis, if this be true I fear there are some of us not on the same basis with business. Certainly it is that there is something wrong somewhere. The fault in a great

measure is due to the faulty figuring of costs on the part of the packers, if they figure at all. For example, mixed papers sold prior to the war at an average price of about eight dollars a ton. Last year the average was about ten dollars per ton. Against this increase of two dollars per ton, we have labor cost up one hundred per cent over pre-war wages, with rents, hauling, etc., all showing a proportionate increase, and even to the acutest students of economics, this would be considered unworkable, and unprofitable. This grade is merely taken as an illustration, and while the comparison is more severe on mixed papers, it applies in a degree to all the other grades of waste material. The mills have their cost systems, and can figure intelligently on operating expenses. If the packers would give this end of their business the proper consideration, they might not do the volume, but what business they handled would be at a profit. Many packers complain of the showing of last year, in spite of the fact that the tonnage was good, and it certainly seems reasonable that a little careful study would go a long way toward building up a more constructive and profitable business.

International Paper Co. Activities in Canada

International Paper Company activities in Canada are being concentrated for the present on the expansion of its Three Rivers mill from 350 tons of news print daily to 700 tons; on the construction of its new Gatineau news print mill at West Templeton, on the Ottawa River, a few miles below the city of Ottawa; on the erection of a hydro-electric plant on the Gatineau River at Chelsea, about six miles above the confluence of the Gatineau and Ottawa Rivers; and on the expansion of its Kipawa mill from about 170 tons of bleached sulphite a day to 250 tons a day.

Four new machines are being added to the present four already in operation at Three Rivers, making eight machines in all, with a total capacity of 700 tons of news print paper a day. Two of the new machines will soon be in operation and it is expected that the last two will begin to turn out news print before summer. The mill, when completed, will burn pulverized coal. Along the St. Lawrence River and adjacent to the mill, the company has constructed a new dock and rebuilt the old one, giving a total of over 1200 feet of dock. Ocean-going steamships can go up to the dock, thus allowing wood, coal, sulphur and other raw materials to be shipped in and paper to be shipped out seven months of the year by water.

Every application of power in the Three Rivers Mill is electric, and it is one of the few 100% electric paper mills in the world.

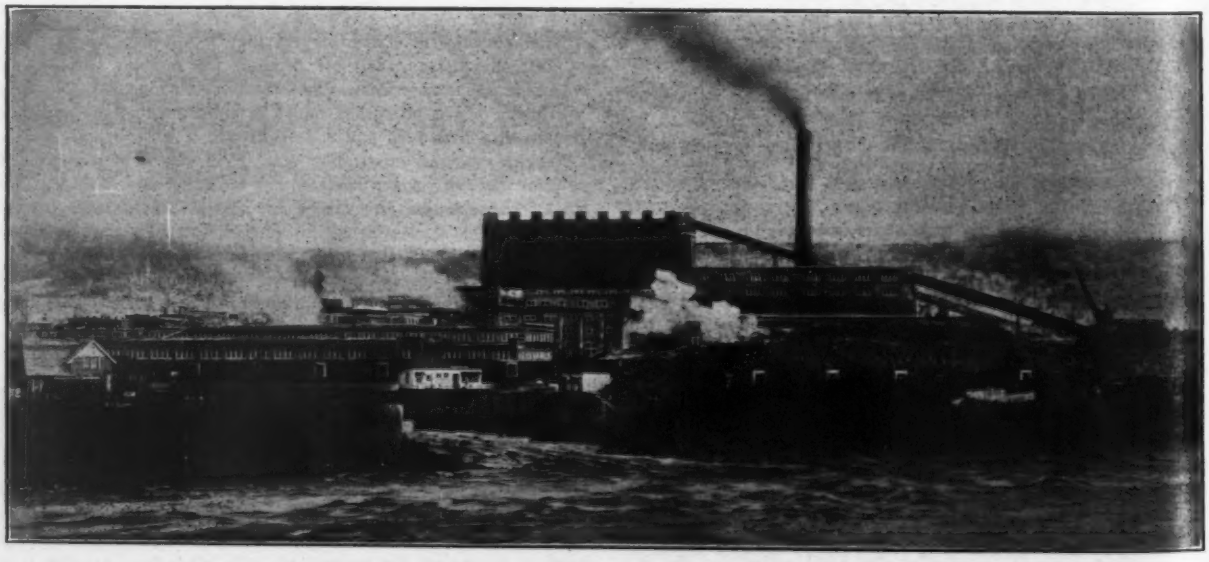
The Three Rivers Mill will be able to produce enough news print every minute to cover more than 2 acres, when the eight machines are in operation, or enough every day to make nearly four million 24-page newspapers of standard size. Or, looking at it from another angle, the mill's daily output would make a strip eight feet wide stretching from the Atlantic to the Pacific.

Construction of the new Gatineau mill at West Templeton and the hydro-electric development at Chelsea are the direct result of the acquisition of the assets of the Riordon Company. The news print mill will have a capacity of about 450 tons daily. Construction work on it has just been started and it is expected that the mill will be in operation early in 1927.

Work on the hydro-electric plant, which will supply the power for the paper mill, was begun about December 1 of last year. In conjunction with the erection of the power plant, a large storage dam is to be constructed in the upper waters of the Gatineau about 100 miles north of Chelsea.

It is said that further extensions of the Kipawa mill, are under consideration. The present extension is due chiefly to an increasing demand for the Kipawa product for rayon or artificial silk. At the present time the pulp of the Kipawa mill, besides supplying paper mills in Canada and the United States, is also being shipped to the principal manufacturers of rayon in the United States, France, Belgium, Switzerland and Italy. The Hawkesbury mill, which produces bleached sulphite pulp, has been running at capacity.

Incidentally, the increased output which the company, through the Canadian International Paper Company, will secure in Canada, will not mean a corresponding gain in the company's news print output, as already several of the company's United States mills have been changed over to the production of other classes of paper. Adoption of the company's new plans as a paper producer should prove equally important to its future as a power producer.



KIPAWA BLEACHED SULPHITE MILL, TEMISKAMING, QUE.

Paper Makers Chemicals Improve During 1925

Market Develops a Trend Toward Steadier and More Normal Conditions Than at Any Time Since the War—Because of Increasing Consumption Prices Advanced on Some Products That Were Selling at Levels Not in Keeping With Present Day Production Costs—On the Whole Prices Were Higher Than Last Year With a Tendency Towards Stabilization at the Increased Figures—Demand Well Maintained.

Written Especially for the Annual Number of the Paper Trade Journal by Guy A. Gardner, Mgr., Chemical Division, M. Gottesman & Co., Inc.

After several years of erratic ups and downs, the industrial chemical market developed a trend towards steadier and more normal conditions during 1925 than at any time since the war. This was true both in regard to price changes and consumption of the leading chemicals and particularly of contract business in the chemicals used by the paper maker. Due to a general improvement in practically all the large chemical consuming industries, the volume of business was undoubtedly the largest since 1920, and with increasing consumption, prices advanced on some products that were selling at levels not in keeping with present day production costs although only in very few instances were these advances of any great consequence. On the whole, prices were higher than in 1924 with the trend toward stabilization at the increased limits.

Many manufacturers increased their production during the year considerably beyond their original estimates due to the improved demand which was well maintained throughout the entire period particularly for caustic soda, soda ash, sulphate of alumina and many other chemicals used in large quantities by the paper manufacturers.

Bleaching Powder

The bleaching powder contract price for 1925 was firmly held at $1.90 for carload shipment on contract sales. In the fall, the price for spot shipment was advanced to $2.00 per 100 lbs. and this price was also made effective for contract shipment over 1926. Many consumers had been obtaining their bleaching powder supplies all through the preceding year on low priced contracts, and shipments during the earlier months of 1925 were therefore somewhat restricted but gradually improved and since then have continued at a very satisfactory rate. The export business on bleaching powder was unusually heavy and helped to keep the market firm for the spring and summer months which was remarkable in view of the fact that the price of bleaching powder at this time of the year generally declines.

Chlorine

Chlorine also was in good demand owing in part to its increased use by the paper maker for bleaching and also to several new uses lately developed that absorb very large quantities and will, no doubt, continue largely to increase the consumption and tend to create a firmer market during the coming year. The Interstate Commerce Commission ruled in favor of placing the new multiple tank car on an equal basis with the old time single tank thus making it possible to use this new method for the shipment of all carloads of liquid chlorine. This important ruling will greatly facilitate handling and shipment to the paper makers. The price was firm at 4 cents per lb. in tanks at the works with the usual advance for drums and cylinders.

Sulphate of Alumina

Little change occurred in the sulphate of alumina market and manufacturers enjoyed a good volume of business with contract shipments fully up to expectations in most instances, particularly during the latter part of the year. The paper maker today is insisting upon a higher standard of purity in sulphate of alumina and as a result, manufacturers are turning out a paper makers' alum of much better quality than ever before while the price as a general thing has not appreciably increased. The use of the iron-free quality has increased considerably of late and with improved manufacturing processes, is being produced today at a very nominal figure. The contract price in the East was $1.40 per 100 lbs. for carload shipment from Western works due to lower manufacturing costs. The iron-free quality was quoted at from $2.00 to $2.25 per 100 lbs. in bags for shipment.

Soda Ash and Caustic Soda

The demand for soda ash and caustic soda was unusually strong starting early in the year and increasing beyond expectations for the whole of 1925. Contract withdrawals were well maintained and the market had a generally firm and healthy tone. Improved manufacturing conditions here and a broader export demand kept the alkali plants busy. The contract price for 1926 is the same as that prevailing for the past two years viz.—$3.10 for caustic 76 per cent and $1.38 for soda ash 58 per cent in bags.

Salt Cake

Salt cake during the early months of 1925 met with a merely nominal call except for an increase in tonnage shipped to the glass makers, but in the late summer months a much better demand developed from practically all the consuming industries particularly from the sulphate pulp manufacturers who were constantly increasing production due to the great improvement in the kraft market. This tended to use virtually all the surplus stocks and as production had fallen off, the increased demand made available tonnage of good quality somewhat scarce. As a result, the price advanced from the lower levels prevailing in the early part of the year and a firm market developed. Salt cake being a by-product has been affected as to production during the entire year by conditions in muriatic acid and against this there has been developing the demand for salt cake from the rapidly growing kraft pulp mills of the Southern United States.

Casein

The price of casein eased off somewhat during the summer months but in the early fall gradually improved continuing until late in the year when a considerable advance was put into effect. The market as a whole was much better than during the previous year, the price fairly well maintained, and the volume of business considerably larger. The price range during the year was from 12½ to 14 cents per lb.

Blanc Fixe

Blanc fixe was in good supply and firm in price during the greater part of the year but later on, the price of dry blanc fixe became easier due to selling pressure. Quotations ranged from 3½ cents to 4½ cents per lb. for the dry material.

China Clay

The China clay market both for imported and domestic qualities kept a very even keel throughout the entire period with very few fluctuations in price of any moment. The demand was fully up to

expectations in most cases particularly from the domestic producer's standpoint as the domestic clays are becoming more generally used owing to consistent improvement in their quality.

Promising Outlook

The outlook for continued good business in industrial chemicals during 1926 is, to say the least, very promising. Fundamentally sound conditions in the basic industries of the country, practically all of which are large chemical consumers would indicate a continuance of good business for the chemical manufacturer and with this favorable outlook, it is reasonable to suppose that 1926 will prove to be a profitable and prosperous year.

Celotex Co. Expands Plant at Marrero, La.

During the year 1925 the Celotex Company installed a fourth special machine for making Celotex at its plant at Marrero, La. This machine produces a sheet 12½ feet wide and ½ inch thick continuously and delivers it to the drying machine, which is 800 feet long. Other equipment besides the machinery and dryer includes automatic cutting knives for trimming the board continuously into standard size sheets 4 feet wide and 8 to 12 feet long.

The board machine was furnished by Black-Clawson and the St. Paul Foundry, the drying machine was designed and built by Celotex engineers as was also the trimming equipment.

This fourth machine brings the total capacity per day to 650,000 square feet of board or approximately 250 tons per day.

In addition to the board machine, the company erected a new shredder building in which are located two 72 inch Jeffery Swing Hammer Shredders each direct connected to 200 HP motors, also additional refining equipment and stock and storage chests are installed to take care of the additional machine.

The company also erected a large Paper Storage Warehouse size 100 x 240 feet with large size Shartle Beater.

The Celotex Company purchased approximately forty acres additional land bringing the total acreage at Marrero to one hundred acres.

The entire yard system of trackage was rearranged so that now one hundred carloads of material can be handled in and out of the plant a day.

Celotex Company also erected four new baling stations at various locations in the state for bringing in the raw material, bagasse. During the season of 1925, 150,000 tons of bagasse was baled for use during the coming year; this is equivalent to 7,500 carloads and about one-third of this total is stored at the plant in Marrero.

The Celotex Company plans for the coming season to provide for a new mill located on the same property and installing two machines at the present time with dryers 1000 feet long; this equipment will have a capacity of approximately 400,000 feet of Celotex per day which will bring the total capacity of the plant to over one million feet per day.

Aerial View of plant of The Celotex Company,
Marrero, La. Taken January 6th 1925 from
3000 feet in the air New Orleans and
Mississippi River

AERIAL VIEW OF PLANT OF CELOTEX CO., AT MARRERO, LA.

Big Development in Canada's News Print Industry

International Paper Co. To Erect Large News Print Unit on Gatineau Limits and Double Capacity of Three Rivers Plant—Price Bros. & Co. Start New Riverbend Mill and Make Extensions to Kenogami Plant—Wayagamack Pulp & Paper Co. Starts New News Plant—Port Alfred Pulp & Paper Corp. to Have New News Print Mill Operating in June—St. Lawrence Paper Mills Build Sulphite Mill.

Written Especially for the Annual Number of the Paper Trade Journal by C. L. Sibley.

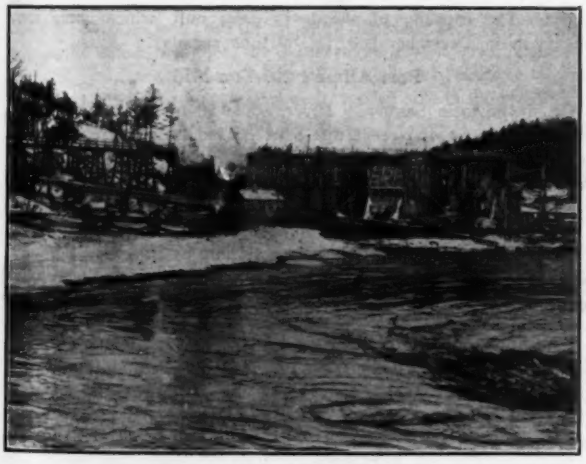
The past year has witnessed enormous developments in the news print industry in Canada, and the most important of these developments have taken place in the Province of Quebec.

First of all comes the decision of the International Paper Company to take over the Riordon properties and to develop these by the erection of a large news print unit in touch with the Gatineau limits, as well as to double the capacity of the news print mill at Three Rivers. A feature of the development is that the International Paper Company is not confining its Canadian activities to the manufacture of news print, but is developing the manufacture of pulp for the production of the new artificial silk called rayon, and as a matter of fact is already supplying the leading rayon manufacturers of the world from its Kipawa mill.

The International's Canadian Policy

The policy of the International Paper Company in Canada is officially outlined in the following letter from A. R. Graustein, the president of the company:

"The International Paper Company's policy of expansion in Canada which began at Three Rivers news print mill, in 1919, has been continued during the past year. The Three Rivers mill is being extended from 350 to 700 tons a day by the addition of four machines which will come into operation in the next few months. The Riordon properties were purchased and work has been started on a 450-ton news print mill at West Templeton, Quebec, to use the wood from the Gatineau limits. Work has also been started on the development of the company's extensive water powers at Chelsea on the Gatineau, both as a source of supply for the mill and for sale to such other industries as may be attracted to the district. The Kipawa mill, which supplies pulp for the principal rayon manufacturers of the world, is being enlarged from 165 to 250 tons a day, and the Kipawa hydro-electric plant is being extended from 7,200 hp. to about 24,000 hp.



CONSTRUCTION WORK AT CHELSEA

Progress of construction on the International Paper Co.'s Hydro-Electric Plant. This view is looking north. It shows the downstream face of the main dam and the construction of temporary sluiceways. Chelsea Island is at the left.

"It is difficult to say what the future expansion will be, but it is the present intention of the company to develop its properties further as the market conditions justify.

"The protection of forest resources against fire is of growing importance. Cutting of timber for the mills where the limits are adequate in size presents no problem, as growth should offset the amount that is cut. The real problem is that of protection against loss from forest fires. The International Paper Company has adopted the best prevailing practice of fire protection for its Canadian limits. With increased appropriations for this purpose, it looks forward to a condition where its fire losses will be a minimum."

BUILDING HYDRO-ELECTRIC PLANT ON GATINEAU

This view is from the top of the mixing plant looking east across Chelsea Island. It shows the concrete delivery track and camp buildings, with Gatineau railroad and dam site in the background.

The World's Largest Paper Mill

In regard to the above, it may be pointed out that when the capacity of the Three Rivers mill is brought up to 700 tons of news print the mill will be the largest paper mill in the world. Two of the new machines will soon be in operation and it is expected that the last two will begin to turn out news print before summer. The mill when completed will be burning pulverized coal. It is understood that a large quantity of the coal burned will be from Nova Scotia mines. Along the St. Lawrence river and adjacent to the mill the company has constructed a new dock and rebuilt the old one, giving a total of over 1200 feet of dock. Ocean going steamships can go up to the dock, thus allowing wood, coal, sulphur and other raw materials to be shipped in and paper to be shipped out seven months of the year by water. One of the outstanding features of the Three Rivers mill of the company is that every application of power in it is electric, and that it is one of the few 100

per cent electric paper mills in the world. When the eight machines are in operation, the Three Rivers Mill will be able to produce enough news print every minute to cover more than two acres, or enough every day to make nearly four million 24-page newspapers of standard size. Or, looking at it from another angle, the mill's daily output would make a strip of eight feet wide stretching from the Atlantic to the Pacific.

The Gatineau Mill

The construction of the new Gatineau mill at West Templeton and the hydro-electric development at Chelsea are the direct result of the acquisition of the assets of the Riordon company. The news print mill will have a capacity of 450 tons daily. Construction work on it has just been started and it is expected that the mill will be in operation early in 1927, that is in about a year. Work on the hydro-electric plant, which will supply the power for the paper mill, was begun about Dec. 1, of last year. In conjunction with the erection of the power plant, a large storage dam is to be constructed in the upper waters of the Gatineau, about 100 miles north of Chelsea.

Stocks Listed in Canada

The International Paper company has appointed a Montreal transfer agent and registrar of its 7 per cent cumulative preferred stock and its common stock and has recently made application for the listing of these securities on the Montreal Stock Exchange. This action is not only a convenience to the Canadian stockholders of the company, but is also evidence of the company's desire to facilitate further acquisition of its stock by Canadians. The interests of the International Paper Company in Canada make it only fitting that its stock should be widely held in this country. Its subsidiary, the Canadian International Paper Company, consumes more pulpwood in Canada than any other company in Canada, and it is in fact one of Canada's largest industrial companies.

Price Bros.' Remarkable Extension

Second only to the International Paper Company's expansion programme are the developments undertaken by Price Bros. & Co. Early in December, the new River Bend mill of the company was brought into operation, thus completing, for the present at least, an extensive programme of Price Bros. & Company, whose result will be to provide the necessary earning power that will have justified the increase in capital five years ago, through the split of the stock 5 to 1, and the increase of the common stock from a little over $8,000,000 to the present total of slightly over $42,000,000.

The River Bend Mill is located on the Little Discharge of the Saguenay River, immediately adjoining the Town of St. Joseph d'Alma within a mile and a half of the Isle Maligne Power Plant of the Duke-Price Power Company, Limited, on the Grand Discharge. This mill has been designed with a view to its possible ultimate expansion to a capacity of 600 tons of news print paper per day. The plant, as at present completed, has a nominal production rating of 200 tons per day. The paper mill is equipped with two (2) 234" Walmsley paper machines, similar to those now in operation at Kenogami, maintaining a daily average of over 100 tons of paper per day. The mill is most modern in all features of design, and is completely equipped for electric operation throughout. Electric steam generators will supply all of the mill steam requirements. Power is transmitted from the Isle Maligne power plant, over a short transmission line, at generator voltage, with a minimum of loss. A separate municipality has been incorporated, embracing the area required for the new mill and townsite. A small, model industrial community has been developed to provide for housing accommodation of a part of the employees of the new plant.

The Kenogami Mills

The extension of the company's Kenogami Paper Mills, to provide for additional news print producing capacity of 200 tons per day, bringing the total rated capacity of that plant to 500 tons per day, was finally completed early in the year, since which time the Kenogami mills have maintained an average daily production of slightly over 500 tons. This plant is now wholly self-contained as to ground wood and sulphite pulp production, and the hydraulic and hydro-electric power developments which have gone forward simultaneously, place this plant in an unusually safe position as regards power supply. The installation of a board machine at Kenogami, now completed and ready for operation, provides capacity for production of newsprint roll wrappers for all the mills of the company and for certain grades of board products. The electric boiler installation of Kenogami Mills, completed during the present year, has a total capacity of approximately 10,000 boiler h.p. Delivery of electric power from the Isle Maligne plant of the Duke-Price Company, to the Maligne plant of the Duke-Price Power Company, to be used for steam generation at Kenogami Mills, commenced in the first half of 1925 and has now reached a total of approximately 90,000 h.p., or sufficient for the production of practically the total steam requirements of that mill. Price Bros. & Company, Limited, now rank as one of the largest producers of newsprint paper in Canada, with a total production capacity of 752 tons per day, in addition to a daily board wrapper output of approximately 55/60 tons.

Merger of St. Maurice Paper Companies

Next, perhaps, in order of importance in news print developments in the Province has been the merger of the Belgo-Canadian Paper Company and the St. Maurice Paper Company, with the result that the two plants are now operating under a common head with a single sales organization. The combination provides under one control, an aggregate output of 650 tons a day, which makes the new company, which is known as the "St. Maurice Valley Corporation," third in size in Canada among news print producers.

Wayagamack's New Paper Mill

Still another development of unusual importance has been the completion of the news print mill of the Wayagamack Pulp and Paper company which formerly manufactured only wrapping paper. The capacity of the news print mill, which came into operation in December last, is 200 tons per day.

Port Alfred's 200-Ton Mill

On the historic Saguenay River, some 50 miles from its junction with the St. Lawrence, the Port Alfred Pulp and Paper Corporation is now constructing a 200-ton news print plant to be ready by June. The new plant will include a paper mill for two 234 inch news machines, grinder room and new steam plant. An extension is being made to the sulphite mill of one digester, which will increase the production of sulphite pulp by fifty tons per day. With the sulphite production already available, the additional digester will give sufficient sulphite pulp capacity for four units of two machines each, with accessories. New timber holdings including some 2,200 square miles of limit, of about 6,000,000 cords, have been recently acquired on the Peribonka river, thus assuring the Port Alfred Corporation of an unlimited wood supply for many years to come. Electric power supply will be delivered through transmission line from the new hydro-electric development of the new Duke-Price interests at Grand Discharge out of Lake St. John, new sub-station and distribution installation to include both sulphite and new paper mills. Geo. M. McKee, a past president of the Canadian Paper and Pulp Association, and well known throughout the entire industry, is president of the Port Alfred Pulp & Paper Corporation.

Eddy Company's Extension

During the year the E. B. Eddy Company has greatly improved and extended its plants at Hull, Que. It has more than doubled its news print output. The sulphite mill has been completely rebuilt and enlarged and new timber limit shave been secured. The company has a varied output which consists of a daily pro-

duction of 120,000,000 matches, 7 tons tissue, 25 tons board, 155 tons news print, 1,000,000 paper bags, 8 tons bags and manila, 15 tons wrapping paper and 10 tons book and writing paper. The company has been operating for the past 73 years. Its site covers about 75 acres at Hull, P. Q., and includes a hydro-electric development. The news print mill buildings are so designed that the present output may be doubled without further extensions.

St. Lawrence Mills New Plant

The St. Lawrence Paper Mills, of Three Rivers, has added to its plant during the past year a modern sulphite pulp mill of 100 tons daily capacity. Up to that time the company had produced ground wood pulp from the St. Maurice Paper Company for some time previous. When the latter added to its newsprint output it required all its surplus sulphite pulp and St. Lawrence Paper Mills had to look elsewhere. The addition of the sulphite pulp mill makes the St. Lawrence property self-contained, and in addition to providing sufficient sulphite pulp for its output of about 135 tons of newsprint daily, it provides it with a surplus of over 60 tons of sulphite pulp for sale outside.

Fraser Companies' New Mill

During the year the Fraser Companies, which operate in Eastern Quebec and New Brunswick, have brought into production their 20,000 ton mill at Madawaska, Me., just across the St. John River from the Edmunston, N. B., bleached sulphite plant. The first unit of the new mill (10,000 tons) came into production early in November, 1925, and the second unit began operating late in December, so that before the turn of the year 1926 the company had the benefit of the full 20,000 tons of sulphite paper products, which this new mill produces. An interesting feature in connection with the new mill is that it operates a pipe line in conjunction with the International bridge across the St. John River. The bleached sulphite flows from the Edmunston mill across the river, via the bridge, to the Madawaska plant.

A New $12,000,000 Mill

Among the big developments foreshadowed for the province are the expenditure of between $12,000,000 to $15,000,000 in the construction of a new pulp and paper mill on the shores of the St. Charles River, Que., by the Anglo-Canadian Pulp and Paper Company, which includes the Rothermere and Clarke interests. Premier Taschereau has been advised that the construction of the huge plant will start early next spring. It is expected that a daily output of 400 tons of paper will be available when the mills are built. The pulpwood will be supplied by the Manicougan River on the North shore, which were leased by auction two years ago by the Clarke interests. According to the lease work had to be started within 18 months after the leasing and already this Fall some preliminary work was made at the point chosen on the St. Charles. It is understood that the whole output will be sent to England.

New Hydro-Electric Development

No review of industrial developments in Eastern Canada during the past year would be complete without mention of the immense hydro-electric project now being carried out at the head waters of the Saguenay River by the Duke-Price interests. Both of the two moving spirits in originating this enterprise, namely Mr. Duke, the American tobacco king, and Sir William Price, the head of Price Bros. & Co., have passed away since construction work began, and the enterprise is being carried out by their successors. It is closely associated with the news print manufacturing mills of Price Bros. & Co., as these obtain a large portion of power from that portion of the waterpower plant already brought into operation.

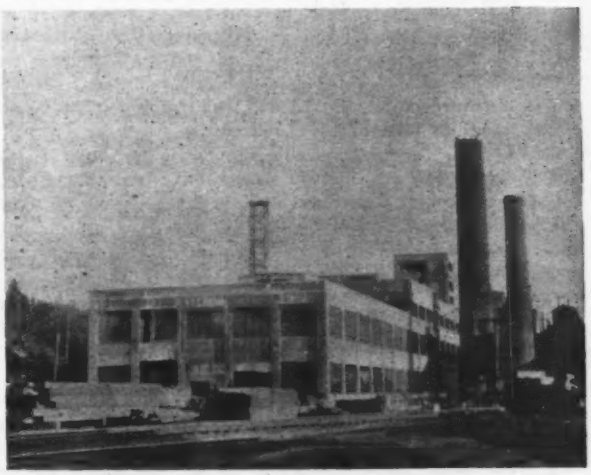
Descriptions of the project have already appeared in the PAPER TRADE JOURNAL. There are two power developments one at Alma of 450,000 hp., and one at Chute-a-Caron of 800,000 hp., the two having a total fall equal in depth to that of Niagara. At Chute-a-Caron the whole body of the Saguenay River is being diverted through an immense canal cut out of solid rock into the Shipshan River, when it discharges again into the channel of the Saguenay lower down.

In order to utilize the major portion of this power, the Aluminum Company of America, through its subsidiary the Aluminum Company of Canada, Limited, is establishing an immense plant for the manufacture of aluminum in a new town now being built on the banks of the Saguenay River called Arvida. This town, it is stated, will become the world's leading center for the manufacturing of aluminum, just as Detroit is the leading center for the manufacture of automobiles. The name Arvida, by the way, is made up from the name of the president of the Aluminum Company, ARthur VIning DAvis.

CROWN, WILLAMETTE SULPHATE MILL

The Crown Willamette Paper Company of Portland, Oregon, is building a new sulphate pulp mill at its Camas plant in Washington. The main buildings are about 320 feet long by 80 feet wide with steel frame and concrete walls, floors and roofs.

Chips are to be prepared in another plant and blown to steel



NEW SULPHATE MILL, CROWN WILLAMETTE PAPER CO.

storage bins through a pipe line. Steam will be delivered from the present boilers and the product as liquid pulp will be pumped to the present mill where it will be made into paper.

Some new features of this mill are the Nordstrom chip drying towers in which the moisture from the chips will be removed by the hot gases from the recovery room, thus reducing the work of the evaporator; and the continuous causticizing system with rotary kiln for reburning the lime.

Some of the principal items of equipment are:

Three revolving digesters furnished by the M. W. Kellogg Company. Two continuous pulp washers furnished by the Olive Filter Company. Quadruple effect evaporator by Zaremba Company. Waste Heat boilers furnished by Edge Moor Iron Works. Three Rotary incinerators by Manitowoc Shipbuilding Corporation. Nordstrom Chip Drying Towers by Combustion Engineering Corporation of Toronto. Continuous cauticizing system by Glamorgan Pipe & Foundry Company. Tower Fans by B. F. Sturtevant Company. Conveyors by Stephens Adamson Manufacturing Company. Two radical brick chimneys, one 90 feet high and the other 150 feet high, by Alphons Custodis Chimney Construction Company. Piping specialties by Crane Company.

Structural Steel by Poole & McGonigle, Portland, Ore.

A. Guthrie & Co. were the general contractors. Excavation was started about the middle of July, 1925, and it is expected that the plant will be started about March first.

The mill was designed by George F. Hardy, paper mill engineer, 305 Broadway, New York City.

Ontario Paper Industry Experiences Fair Year

Orders Usually Small but Numerous and in the Aggregate Amounted to Very Respectable Proportions —Few Price Changes During Past Twelve Months and What Readjustments Did Take Place Served to Stabilize and Make the Market More Satisfactory—Not Expected That 1926 Will Be Boom or Record Breaking Year but It Is Expected to Be Improvement Over 1925—Few Forest Fires During Year.

Written Especially for the Annual Number of the Paper Trade Journal by G. W. Brock.

The pulp and paper mills of Ontario during 1925 had a very fair year and, while orders were mostly small and varied, still in the aggregate they were numerous and amounted to respectable proportions. News print was the most active and book and writing and specialty lines, while not enjoying a boom, came out much better than the products of other industries, particularly during the last six months. There was more and more a disposition on the part of distributors to let the mills carry the load and to place orders only as required, but this appears to be one of the trends of present day merchandising.

The relations between the mills and the jobbers were on the whole very friendly and, through a cooperative spirit, the elimination of a number of abuses and trade practices as well as standardizing certain grades, the industry has arrived at a sound and stable period and looks with every confidence to a distinct improvement during 1926. The Canadian Paper Trade Association, which practically embraces in its membership one hundred per cent of the distributors of flat papers in Canada, has done good work and cleared up many misunderstandings and points on which friction might easily arise.

Collections are improving, printing houses are getting busier and inquiries more numerous. There is not nearly the foreign paper coming in that there was a few years ago and each month sees fewer visits from representatives of American concerns. The Ontario pulp and paper plants are turning out worth while products and, where specialization has been resorted to to meet outside competition, domestic mills have more than held their own on merit and adoption of the slogan "Made-in-Canada." Large book and writing concerns have been developing an export trade in these lines as well as bond, kraft etc. with Great Britain, Australia, New Zealand and the West Indies which shipments have taken care of a good deal of the surplus output, while the home market has been in no sense neglected.

Active Selling Campaign Conducted

It is true that, during the past year, orders were difficult to secure in many instances but a strong, selling campaign was conducted by the mills and paper houses, backed by liberal advertising, sample books, house organs and direct-by-mail publicity. There was considerable rivalry between the various distributors regarding who could prepare the most attractive advertising and the propaganda brought good results. Business on the whole was better in the small towns and cities than in the larger centres and there were among paper houses few financial reverses. It may be said that all the wholesale paper firms in Ontario are on a sound monetary footing and are well organized. The majority of the jobbers will show an increase in volume over 1924—which was a rather trying year.

During the past twelve months there were very few changes in prices and, what readjustments did take place, served only to stabilize the lines and make merchandising methods more satisfactory all round. It is not expected that 1926 will be a boom or record breaking year but it is fully expected that collections will be better, the printing trade more active, purchasing more generous and collections more prompt.

Looking to the future the prospects appear much brighter than a year ago. Gradually since last summer, signs of improvement have appeared, one by one, hesitating at first and scarcely recognizable but gaining strength as the outcome of the harvest became more assured. There has been a gratifying gain in railway earnings, an excellent field crop was garnered and prices on farm produce have been enhanced. The position and prospects of many allied commercial lines are decidedly better. With a general reduction of indebtedness, and ample supply of money and increased activity in industrial enterprises and constructional projects the stage is set for an all round improvement in paper as well as in many other businesses.

A Noticeable Improvement

There is little need to individualize but of late there has been a noticeable improvement in production and an increase in the price of paper boards, while paper box manufacturers are increasing their facilities and in some instances erecting new factories and adding to their mechanical equipment. The pulp market is showing more strength after a quiet period during the first part of the year, while manufacturing stationers and envelope producers have encouraging stories to relate during the past few weeks. Toilet and tissue plants in spite of cheap foreign goods, have held their own, kraft papers have been in fair demand and wrappings are now enjoying more inquiries and larger sales. Coated paper establishments have not done as well as they would like.

As yet the paper business is by no means normal but things are headed in the right direction and the route for 1926 appears to have less detours and a smoother surface than it did last year. In this connection it is important to note that the Ontario government has recently approved the erection of new paper mills and additions to others already in operation, which will within the next three or four years, increase the daily output of news print from 2,500 tons to 4,500 tons, add immensely to the investment in the industry and employ a further ten thousand men, making a total of twenty thousand engaged in the calling.

Few Forest Fires

Ontario during the past year was remarkably immune from destructive forest fires, due largely to the effective work of the aeroplane service. Reforestation is being encouraged in rural communities and a hearty response on the part of county authorities has been met with. The Department of Lands and Forests which is under the able direction of Hon. James Lyons, possesses a fleet of twenty hydroplanes, including two of the fastest machines in the world and, in patrol and survey duty, they have achieved remarkable results. In 1925, only 10,154 acres were ravaged by forest fires and in 1924 when the service was started 14,600 acres were flame swept. In 1923, the damage by forest con-

flagrations was very heavy, being above two million acres. For a number of years previous the average loss in timber tracts was over a million acres. It would appear from the splendid showing of the past two years that many dangers which formerly beset the forest, have been overcome through the airplane fleet.

The province has also made every effort to have as much raw material as possible turned into the finished product at home. Arrangements have been made with the railways and the Customs department at Ottawa, whereby no wood may leave the country unless there is attached to the bill of lading a clearance from the Crown Timber Agent in the district from which the cargo is shipped. The clearances are issued by the agent when the shipper makes the affidavit. The purpose of the act is to promote the manufacture of wood products at home.

Reforestation Activities

In regard to reforestation there are seven planted forests in the province of Ontario, each consisting of four hundred acres or more, and aggregating somewhat more than four thousand acres. The largest forest station is at St. Williams in Norfolk county where one thousand acres have been planted. The oldest of these planted areas are now over fifteen years old and they are real forests, with trees four to six inches in diameter and twenty to thirty feet in height. The tree material for Ontario planting plans is supplied from the three forest nurseries at St. Williams, Orono and Midhurst and together they contain around 35 million young trees in various stages of development in preparation for planting in the fields.

Among Paper Concerns

Abitibi Power and Paper Company and the Spanish River Pulp and Paper Mills are developing extensive planting programs.

Ontario leads all other provinces in re-establishing forests on waste or denuded lands. In the last eighteen years the Provincial Forestry Branch has distributed among farmers and other private individuals, to counties and to municipalities close to 15 million tree seedlings and cuttings for planting purposes. These young trees are planted at the rate of one thousand to the acre. Ontario has thus created about fifteen thousand acreas of new forests in the last eighteen years or at the rate of 830 acres a year. Head of the Lake pulp and paper concerns which have tendered successfully on the Nipigon limits, the Ontario Government is selling them the right only to cut so much cordage annually.

In announcing that contracts which will precipitate $40,000,000 of construction and development work in areas contiguous to Fort William will be signed shortly. Hon. James Lyons, Minister of Lands and Forests says that the companies are getting 21-year leases, renewable upon the terms of the 1946 Ontario Government. Companies will be obligated, to begin development work 30 days after the agreements are signed. Plans are under way at the Head of the Lakes for an immediate winter start, with actual construction beginning on the first spring break.

The provision that the companies must utilize all merchantable timber is introduced with a view to conserving timber stands. With regard to the natural reforestation effort, the department has determined that 1,500,000 cords is sufficient wood to maintain each 100-ton unit in perpetuity, provided fire loss is eliminated. They say 1,500,000 cords will maintain a 100-ton unit for 40 years, and in 40 years' time under the new policy it is hoped to create a new forest. The plants to be built under the leases being arranged cannot be completed in less than four years.

Abitibi Completes Island Falls Plant

The Abitibi Power and Paper Company, Iroquois Falls, Ont., completed its new Island plant and turned on the power a few weeks ago. The Abitibi Company is looking ahead to be assured of sufficient power for an expansion programme and some time ago bought the Island Falls plant from the Hollinger Consolidated Gold Mines. It is the ultimate intention of Abitibi to increase its production of news print by 300 tons a day, making 800 tons in all but just when construction will be undertaken, cannot be determined at the present time.

Another important move was made by the various pulp and paper mills when, at a joint conference, it was decided to standardize safety work with a view to reducing the number of mishaps and bring about a general improvement in the records shown in the different plants. The mills of Ontario have adopted the principle of working in groups and classifications have been made which are working out successfully and much interest has been developed in safety. Representatives in each group will visit other plants and exchange ideas and information.

Thunder Bay Co. Gets Pulpwood Rights

The Thunder Bay Paper Company, Port Arthur, Ont., which was recently granted a fixed assessment, has been given rights to cut pulpwood on a tract of 2000 square miles of government-owned spruce lands north of Lake Superior. Under the provisions of the agreement the company must increase its production for period of years. It agrees to be producing 100 tons of news print by October next and 200 tons by October 1, 1929.

The Frontenac Paper Box Company, Limited, of Kingston, Ont., removed to Belleville, Ont., where it began operations. The company is a subsidiary of the Fisher Paper Box Company of Toronto.

In the wholesale paper line two outstanding events were the purchase of the business of the John Martin Company, of Winnipeg, Calgary and Edmonton by the Provincial Paper Mills, Limited, and the acquisitions by the United Paper Mills of the Allen Paper Company, Toronto, the staff of the latter concern being taken over by the United Paper Mills.

To Start Sulphite Plant at Merritton

For some time there has been a report that the Internationtl Paper Company would put into operation the old sulphite plant at Merritton, Ont., which for many years was run by the Riordon Company. The plant, which has been closed since 1923, is equipped with four digesters and three wet machines and its output is 30 tons daily of sulphite fiber. There is also talk of the company converting the mill into a power house, power being developed by the old Welland Canal from the big wastage at Goose Island, near the Thorold town line.

The old Foley-Rieger pulp plant at Thorold, Ont., which was idle for many years, was taken over by the Davy Pulp and Paper Company and practically rebuilt. Considerable new machinery has been installed and the output will be about 20 tons a day. The mill was acquired from the Beaver Board Company by the Davy Company which also got the old Battle mill which is also being fitted up.

McLarty Brothers completed a contract for the erection of a groundwood plant on the Kagawong River, Manitoulin Island, for the Fox River Paper Company of Fox River, Wis. The plant is equipped with three grinders and has a capacity of about 20 tons a day of mechanical pulp. The purpose of the Fox River Company in building this mill was to grind the pulpwood from Manitoulin Island and to ship the pulp to its mill on the Fox River.

Dryden Paper Co. Fairly Busy

The Dryden Paper Company of Dryden, Ont., was fairly busy during the whole year and shipped considerable kraft pulp into the United States. The sheathing paper business in Western Ontario was also very good owing to the excellent harvest.

During the year the plant of the Glengarry Pulp Company at Cornwall, Ont., which has been idle for some time, was sold to George A. Stiles, K. C., representing Mary Jane Ross, one of

the bondholders, for $24,500. The proceeds go to the bondholders, Mrs. Ross and the Thompson & Heyland Lumber Company. The sale by tender was directed some months ago but no bids were received, hence the property was put up at auction.

The Hammermill Paper Company of Erie, Pa., has for years maintained an office in Fort William, Ont., under the management of M. Cochran. In 1924 the company bought and shipped from the head of the Great Lakes 62,000 cords of pulpwood and in 1925 some 80,000 cords. During the coming year the Hammermill Company proposes to spend $1,000,000 in the Thunder Bay district in the purchase of pulpwood.

Fort Frances Erecting New Mill

The Fort Frances Pulp and Paper Company, Fort Frances, Ont., some 13 years ago erected a news print mill and installed two machines which are turning out to-day 130 tons of paper. A large proportion of the wood required for the mill is purchased from the farmers in the Rainy River district and about 75 per cent of the output of the mill is exported to the United States, the Western Canadian market not being sufficient to absorb the production. Early in 1925, an agreement was made whereby an additional mill was to be erected in the town, with an output of 150 tons of news print daily. This plant will be completed and in operation by the end of 1926. The combined production of the Fort Frances Company's mills will then be between 250 and 300 tons of paper daily and, in the operations, about 500 men. will be employed. Work is already well under way on the new mill.

The Mattagami Pulp and Paper Company, of Smooth Rock Falls, Ont., installed equipment for the bleaching of a portion of its output of sulphite pulp and about half of the product which is around 200 tons daily will be bleached. It is expected the Company will be reorganized in a short while. The debenture holders some time ago formed a plan which has been acquiesced in by a majority, and, under the arrangement, a new company will be formed which will pay off the first mortgage bonds of the old one. Bonds in the new concern will be sold to pay off the old bondholders.

The Detroit Sulphite Pulp and Paper Company, Detroit, Mich., which has an office and yard in Fort William, Ont., paid out during the past season some $300,000 for pulpwood which was shipped from the head of the lakes to Detroit by the company's own fleet of barges and steamers. The yard of the company is equipped with an electric loader which can load wood into boats and barges at the rate of 450 cords a day.

Keewatin Lumber Co. Expands

An extensive construction program has been begun at Kenora, Ont., by the Keewatin Lumber Company, and an addition to the paper mill is being built. The order has been placed for another machine, 234 inches wide, which will be located on the north side of the present building, paralleling the other machine, and in the space now being used as the finishing room. The addition will be used as a finishing room and shipping department. The capacity of the present groundwood pulp plant will also be doubled and will mean a building of about equal size to supply the demand of the 250-ton paper mill. It is understood that work will also be begun soon on the erection of a sulphite plant which will be located on the old baseball grounds near the mills.

During the year as a result of the agitation for an embargo on the export of pulpwood from private lands, the farmers and settlers of the Thunder Bay district organized and opened an office in the Graham & Horne Building in Fort William, Ont., This was for the purpose of advancing their cause in connection with the pulpwood business and to carry on work deemed helpful in opposing such efforts as might be made to impose an embargo or heavy tax on pulpwood.

The Great Lakes Paper Company, of Fort William, Ont., which has been for two years operating a groundwood mill of 160 to 170 tons capacity, will, it is expected, erect a news print mill during 1926. An early announcement of the intention of the company is expected.

Nipigon Corp. To Build News Print Mill

The Nipigon Corporation, of Nipigon, Ont., intends putting up a 200-ton news print mill, having obtained additional limits from the Ontario Government. The present pulp plant was built in 1921 and started operations in the winter of that year, being controlled by the Nipigon Fibre & Paper Mills. The company went into liquidation and the plant was sold in 1923 to the Nipigon Corporation. It resumed activities a few weeks later and is now turning out 50 tons of groundwood daily.

Much interest as already stated was developed in safety work In all Ontario mills during the year and good progress was made, while the units in the various companies were found to vie with one another in reducing the severity and frequency of accidents. The question has been taken up with representatives of various plants of including woods operations within the scope of the activities of the Ontario Pulp and Paper Makers' Safety Association. Various firms interested in woods operations have expressed themselves as anxious to see the work begun as they are conscious of considerable leakage in the camps due to inadequate care of minor injuries at the time of their occurrence.

The Thompson & Heyland Lumber Company, of Toronto, handled about 100,000 cords of spruce, balsam and poplar and during the first few months of the year shipped out wood at the rate of 500 cords a day to various plants in Ontario and across the border. The Thompson & Heyland Lumber Company supplied the Mattagami Pulp and Paper Company of Smooth Rock Falls, Ont., with 20,000 cords of unpeeled spruce. They also operated several rossing plants at different points along the Canadian National Railway.

The Quinte & Trent Power Company which is a subsidiary of the Canadian Paper Board Company, which has plants at Frankford and Campbellford, Ont., and Montreal, is erecting a new power house at Frankford which will cost about $200,000. Another power house is being put up at Campbellford at about the same outlay. The company turns out paperboard and ground wood pulp at Frankford, Ont.,

The Lincoln Pulp and Paper Company, Limited, was formed and acquired the assets of the Lincoln Mills Limited, Merritton, Ont. The properties operated by the company include the Lybster Mills, Lincoln Paper Mills, Lincoln Flour Sack Mill and sulphite pulp plant, all located in Merritton; a sawmill at Maria, Que., and a pulpwood plant at New Carlisle, Que., as well as timber limits consisting of 281 square miles located in the Gaspe Peninsula, Que.

Several important sales of pulpwood were conducted by the Ontario Department of Lands and Forests in the Lake Nipigon district, comprising from 1,200 to 1,800 square miles each. The sales were all made by tender. The Thunder Bay Company and the Provincial Paper Mills, Port Arthur, and the Nipigon Fibre Corporation, Nipigon, were successful in their tenders. The price in all cases ranged from $2.00 to $2.25 for pulpwood per cord. Two new features are incorporated in connection with the allotments. The government reserves the right to sell the standing jack-pine to other operators on the areas let to each one of the pulp and paper companies. The other feature is that the government leases specify that the pulpwood must be converted into news print in Canada before being exported. The sale, according to Hon. Mr. Lyons, Minister of Lands and Forests, will bring the production of pulp in the Thunder Bay district up to 840 tons daily and will increase the news print output to about 1,500 tons eventually.

The handsome new building of the Forestry Department of the University of Toronto, located on St. George street, Toronto, was completed during the year. It is modernly-equipped and in the new quarters several additional courses of study and work will be undertaken. Dr. C. D. Howe is at the head of the Faculty of Forestry.

British Columbia's Pulp Wood Resources

Nearly Two-Thirds of Total Merchantable Canadian Timber Growing on Vancouver Island—Present Consumption Can Be Increased More Than Ten Times by Using Small Materials Now Left Over From Logging Operations and the Development of Interior Spruce Stands—All Timber Is on or Near Salt Water and Mills Can Be Erected in Sheltered Deep Water Harbors, Thus Facilitating Transportation.

Written Especially for the Annual Review Number of the Paper Trade Journal by Frank Giolma.

Out of the total stand of timber in the Province of British Columbia of 366,300,000 M. feet b.m.—half the total merchantable timber of the whole of Canada—there are estimated to be over 182 billion feet b.m of pulpwood composed of 73 billion feet of spruce, 64 billion feet of western hemlock, 32 billion feet of balsam, 12 billion feet of lodge pole pine and 1 billion feet of cotton wood. Nearly two-thirds of this timber—127 billion feet—is growing on Vancouver Island.

The annual consumption of British Columbia pulp wood is 225 million feet b.m., this can be increased more than ten times by utilizing small material now left from logging operations and the development of interior spruce stands.

Chief Pulp Wood Markets

At present the chief markets are Australia, New Zealand, Japan and the western coast of America. The recently signed treaty with Australia gives Canada a valuable preference in the matter of pulp and paper and its effect is already being felt.

There are two paper mills in British Columbia, the Powell River Pulp and Paper Company at Powell River, and the Pacific Mills at Ocean Falls; also four pulp mills, the British Columbia Pulp and Paper Company's mills at Woodfibre, Howe Sound and Swanson Bay, both on the mainland, and at Port Alice on Vancouver Island; and the Beaver Cove Pulp and Paper Company Mill at Beaver Cove, also on Vancouver Island.

Symptomatic of the interest that big business is now taking in the natural resources of British Columbia generally and in its timber in particular, is the fact that the Beaver Cove Pulp and Paper mill has just been taken over by the International Harvester interests, who are preparing to greatly increase the mill's capacity and to manufacture paper as well as pulp. The extensions, additions and alterations will lead to an expenditure of from ten to twelve million dollars, spread over the next two or three years. At the present time other large interests have their timber specialists examining stands of timber, some on the mainland, others on Vancouver Island. In short, more interest is today being taken in British Columbia timber and pulpwood than has ever been shown in the past.

The capital at present invested in British Columbia pulp and paper mills is estimated at $41,111,470 and the mills give direct employment to over 2,500 persons, not including those employed in the woods, and have an annual payroll of over $4,217,000.

Vancouver Island Advantages

As stated above nearly two-thirds of this timber is growing on Vancouver Island. The Island is 285 miles long, with a width varying from 9 to 90 miles. The center or backbone of the island is a mountain range, the timber growing on the lower slopes down to the edge of the sea. As a result, all stands of timber are either on or near salt water and mills can be erected in sheltered deep water harbors so that ocean going vessels of any size can load at the mill side. There are also distributed over the island more than 500,000 undeveloped horsepower in waterfalls and rapid rivers which never freeze up and which can be easily harnessed, such as Campbell River Falls, 70,000 h.p.; Jordan River, 25,000 h.p.; Sproat Falls, 5,000 h.p.; Drinkwater Falls, 5,000 h.p.; Nimpkish River, 25,000 h.p.; Puntledge River, 22,000 h.p., and Cass Creek, 14,000 h.p.

Take for example the stand of from two to three billion feet of pulpwood in the Barclay Sound district south of, and on the North washed by the deep ocean waters of the Alberni Canal or Fjord. Here you have thickly growing timber, natural deep water

FOREST SCENE SHOWING FROM LEFT TO RIGHT, DOUGLAS FIR, WESTERN HEMLOCK, RED CEDAR AND SPRUCE.

harbors and ample water power at either Stamp Falls, 20,000 h.p. or Sarita Falls, 3,000 h.p., all within a radius of ten or twelve miles. The one link missing in the industrial chain is capital and the same is true of the pulp wood situation throughout British Columbia generally. Each year on an average, 60,000 acres of the timber lands are logged off, on which it is estimated that at least ten cords per acre suitable for pulp are left to rot, owing to the fact that there are no mills within a short distance. If this waste were utilized it would be sufficient to keep six mills, each with a capacity of 250 tons of paper a day, working throughout the year.

Owing to the mild equable climate, with an average annual summer day temperature of 60°, and winter of 40° and no extremes of heat or cold, work is never retarded by climatic conditions, the year giving 100 per cent working days, and labor, liking its congenial surroundings and climate, is plentiful and of good steady quality.

Special Features Summarized

The special features affecting the pulp wood interests in British Columbia may be summarized as follows: the harbors of British Columbia are open all the year round. All the pulp and paper mills now in operation in British Columbia and the majority of good pulp wood propositions now available are on deep water and cargoes of pulp and paper may therefore be loaded in the ocean vessels at the mill. The average cut of pulpwood in other parts

PEEP AT TYPICAL VANCOUVER ISLAND VALLEY

of the continent is about five cords per acre, in British Columbia the average per acre is 20 to 40 cords, and frequently much more. The timber in the majority of cases being near the mill and logging conditions being most favorable throughout the year, logs are delivered at the mill at comparatively low cost. Spruce and hemlock in British Columbia are much superior to those woods in the east, being larger, clearer and with fewer knots. On account of these and other features, it is found that two cords of British Columbia pulpwood are equivalent to three cords of eastern pulpwood.

British Columbia and Pacific Coast mills generally have the exclusive command of the Pacific Coast markets, both in Canada and in the United States, as well as the interior markets in both countries for about 800 to 1000 miles inland, when the products of these mills may come into competition with eastern mill products, but the Pacific Coast mills have no rivals in the markets of the Orient, namely Japan, China, India, New Zealand, Australia, also South America, West and South Africa and the Atlantic coast of North America and Europe, these last via the Panama Canal.

AN ISLAND LOGGING TRAIN OF FIFTY CARS

The cheaper cost of raw material and all other essentials for the manufacture of pulp and paper, and the fact that cargoes are loaded in open vessels at the mills and that no trans-shipment or handling is necessary until the destination of the cargo is reached, easily equalizes or overcomes the difference in freight rates for the longer haul to Europe and Eastern markets.

The vital importance of these great stands of timber today growing in British Columbia will perhaps be better realized when it is remembered that the amount of wood used annually for pulp wood purposes alone in America would, if piled up four feet high and 12 feet wide, reach clear across the Continent from the Pacific to the Atlantic.

STANDARDIZING BONDS AND LEDGERS

Manufacturers of bond and ledger paper will probably be called to a conference in Washington some time before May 1 by the Public Printer, in connection with some work which has been done in the Testing Laboratory of the Government Printing Office under the direction of E. O. Reed, chief of the laboratory.

It may be remembered that some two years or more ago, Mr. Reed did some work on the grading of bond and ledger papers, following which the Government Printing Office adopted seven grades as standards. This matter was later taken up by the printers and at least one of the associations adopted these standards.

Some months ago Mr. Reed asked the mills for other samples in order that the work done a couple of years ago might be checked over. This has been done and it is understood that this work is about completed. It is understood that officials of the Government Printing Office are anxious to have the cooperation of the mills in this work and to this end will call a conference at some date in the future.

HEAVY PULPWOOD SHIPMENTS

Pulpwood shipments to paper mills in Appleton, Kimberly and Kaukauna now are averaging about 150 carloads a day, the largest number of the season. The logs will continue to arrive in this quantity for several weeks. About five trainloads of pulpwood pass through Appleton Junction daily. The train movement is under the supervision of P. Gaudette, trainmaster, located at Appleton Junction during the rush season. The number of trains passing through Appleton Junction has been increased to 40 trains a day.

PAPER MEN BANQUET IN NEW YORK

Numerous Dinners Held at Various Hotels by Paper Manufacturers, Merchants and Technical Men During Paper Week

Annual Banquet of American Paper and Pulp Association Proves One of the Most Brilliant and Successful Events Ever Held—Senator Fess, of Ohio, Makes Impassioned Patriotic Address and Reviews Our International Relations and Various Other Problems of the Administration—Explains Tax Reduction and Revision and Expresses View That Measure Will Encourage Capital in Developing Industry.

Several hundred members and guests of the American Paper and Pulp Association assembled at the 49th anual dinner of the organization in the grand ballroom of the Waldorf-Astoria, Thursday night, this notable event winding up an exceptionally interesting paper convention.

The guests and members gathered early for the reception in the Astor Gallery, and promptly at 7:30 p. m., marched to the banqueting hall and located their tables. After the Star Spangled Banner had been played by the orchestra, the assembly took their seats and proceeded to enjoy the excellent dinner provided, which consisted of Mixed Fruit Cocktails; Cream of Sorrel Santé with Toasties, Celery and Olives; Aiguilette of Sole, Bonfemme, Potatoes and Rissolees; Sweetbreads, Montebello Style; French Green Peas; Breast of Partridge, Tyrolienne; Hearts of Romaine, with Orange and Grapefruit; Bombe Trocadero Ice Cream, Assorted Cakes and Macaroons; Coffee, White Rock, Herbert Tareyton Cigarettes and Cigars.

An artistic menu and program contained the names and connections of the officers and executive committee of the American Paper and Pulp Association; the Banquet Committee, and the Reception Committee; the names of the ex-presidents from the beginning of the association in 1878, and other timely information. This beautiful menu was engraved and printed by the Osborne Company, of Newark, N. J., on antique art parchment, through the courtesy of the Paterson Parchment Paper Company, of Passaic, N. J.

Norman W. Wilson Presides

Norman W. Wilson, president of the association, was toastmaster, and seated with him at the speakers table there were Edward Beck, J. C. Mallalieu, D. C. Everest, the Hon. Axel Wallenberg, Magnus W. Alexander, Arthur B. Daniels, Albert M. Miller, Dr. John L. Davis, Frank W. Clarke, the Hon. Simeon D. Fess, George W. Sisson, Jr., J. A. Carpenter, Egmont L. Frankel, George W. Knowlton, C. A. Crocker, Judge Charles F. Moore, Henry A. Wise, and Alexander G. Gilman.

Mr. Wilson, in a few well chosen remarks, rightly described the gathering as, "Large in Numbers and Great in Enthusiasm." He paid a well-deserved tribute to the work of the vice-presidents of the association and after introducing several of the noted guests, requested his old friend Judge Charles F. Moore to address the gathering.

Judge Moore Speaks

Judge Moore, who was vociferously received, expressed his keen delight at being able to be present at another banquet of the organization. He praised the development of the association's work under President Wilson, Dr. Hugh P. Baker, their associates, and the members of the organization. Judge Moore concluded by conveying his sincere wishes for the future welfare of the American Paper and Pulp Association and its members.

Senator Fess Addresses Gathering

The toastmaster then introduced the principal speaker of the evening, the Hon. Simeon D. Fess, United States Senator from Ohio, who, in an impassioned and patriotic address reviewed the questions of the day. He declared that he had accepted the invitation to address the meeting largely because of what the American Pulp and Paper Association represents, and the keen interest taken by members of the paper industry to affairs of the moment. Senator Fess expressed his pleasure and surprise at meeting Judge Moore at the gathering, and conveyed to the audience his great admiration of one of the oldest and best friends of the paper nidustry.

Discusses Tax Reduction

Senator Fess then went into details of the Tax Reduction Bill, signed that day by President Coolidge. He expressed his approval, and said that he had never known a tax measure to receive such an enormous majority. At the same time, Senator Fess did not quite agree with the high figure set for exemption, and stated that every citizen should esteem it an honor and a patriotic duty to take his share in paying the taxes.

He pointed out what a precarious state the finances of Great Britain would be in if the tax exemption figure of that country were set so high. The speaker declared his opinion that the tax revision was more important than the tax exemption, and said that the result of the measure will be to encourage capital to render greater assistance to industry.

Our International Relations

Senator Fess went on to discuss our international relations and engagements. He reviewed the foreign loan settlement progress, and spoke highly and with evident feeling of Great Britain's lead in meeting her responsibilities. "That great nation regarded its obligation as sacred," declared the speaker, "and entered, without any hesitation, into a complete adjustment of its financial relations with the United States."

Senator Fess mentioned that Belgium, Italy, Roumania, Czecho-Slovakia, and some small countries, had already made arrangements to fund their debts. He explained the concessions granted to Italy and stated the conditions that led to it. That country had gained practically no concessions for her participation in the war, and had also been badly hit by our emigration restrictions. Then again, Italy is not as rich in natural resources as many other countries, declared the speaker.

Referring to the limitation of arms, Senator Fess declared that the causes of war will constantly arise in future, as today. "Men differ, and nations differ, honestly," said the speaker, "and this is the basis of war." He asserted the conviction of the present administration of the need for the World Court, to which he was totally committed, although opposed to the League of Nations.

Our Duty to Lead the World

Senator Fess expanded on the problems of international relations that the country is trying to solve, and expressed the belief that it was our duty to lead the world, on account of our superior

PICTURE TAKEN AT THE FORTY-NINTH ANNUAL BANQUET OF THE AMERICAN PAPER AND PUL

SSOCIATION AT THE WALDORF-ASTORIA HOTEL, NEW YORK, THURSDAY EVENING, FEBRUARY 25, 1926

position, and tremendous financial power. He mentioned that the United States was first in agriculture, first in transportation, first in banking resources, first in mining and manufacture, first in managerial ability, and first in skilled labor.

He spoke of the fate of the various Security Pact proposals, and praised the Locarno Conference, at which agreements were ratified for the first time, thus opening the way for peace in Europe and the limitation of armaments.

Senator Fess urged President Coolidge to call a second disarmament conference in the near future. "If the debt problems and the question of armaments could be adjusted under American leadership, it will only reflect the commanding position our country occupies in advancing the peace of the world," concluded Senator Fess.

Dr. Davis Arouses Laughter

Dr. John L. Davis, who followed Senator Fess, gave an amusing speech, which created ripples of laughter. He declared that it always surprised him that every Senator of the United States he had heard knew exactly where every dollar comes from, and where every dollar goes to.

Referring to the recent criticisms of George Washington, he said that, personally, he would have been surprised if George Washington did not swear, considering all he had to put up with.

Dr. Davis also commented on the Father of our Country's alleged fondness for hard liquor and expressed his admiration for his honesty and humanity. The speaker divided American citizens into two classes—those who have a little still, and those who have still a little.

SALESMEN'S ASSOCIATION DINES

Good fellowship reigned supreme at the seventh annual banquet of the Salesmen's Association of the Paper Industry, held Tuesday night on the Roof Garden of the Waldorf-Astoria. Vocal numbers were provided by the Right Quintette, and the diners joined with spirit in the singing.

Walter E. Perry, president of the association, occupied the chair, and after a brief greeting, introduced as the first speaker of the evening the Rev. Dr. James Gordon Gilkey, D. D., of Springfield, Mass.

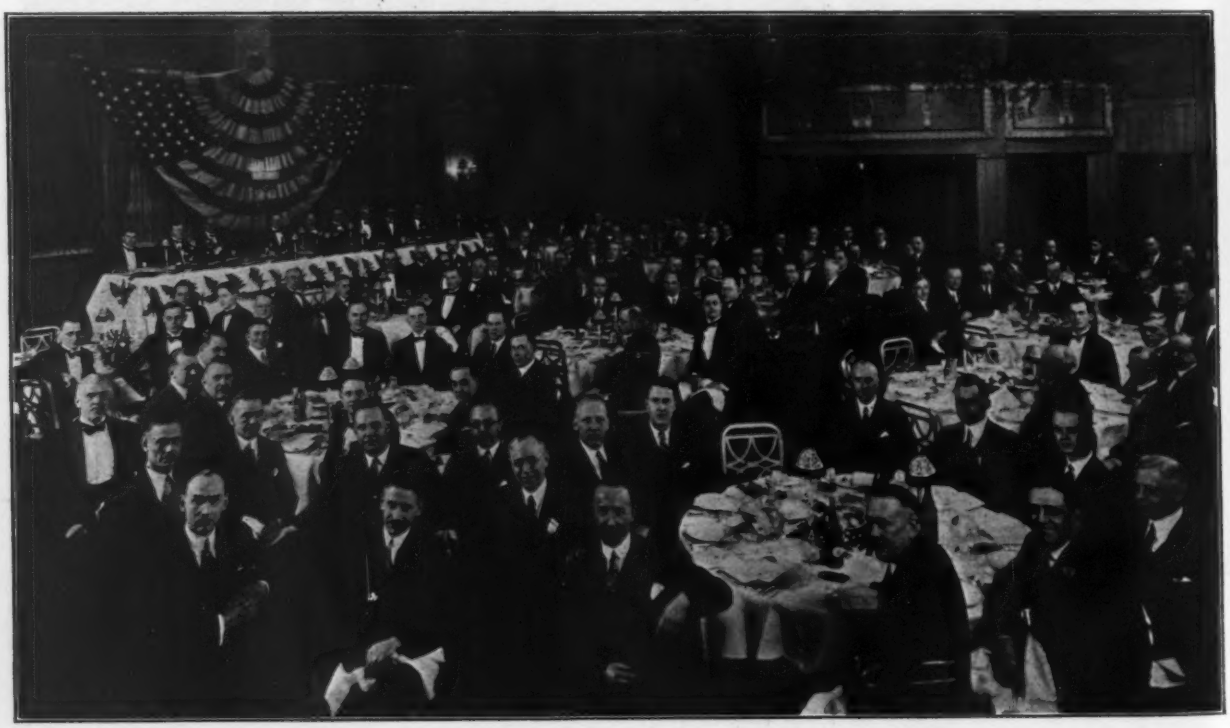
In a sparkling speech, sprinkled with humorous anecdotes to emphasize his points, Dr. Gilkey demonstrated the four principles of salesmanship, as follows:

"Always remember every man is a prospect, but that every man is not a sale; learn to make your hardest effort when things are going against you; learn to put your imagination into your work; and the greatest happiness in the world comes from achievement, not idleness."

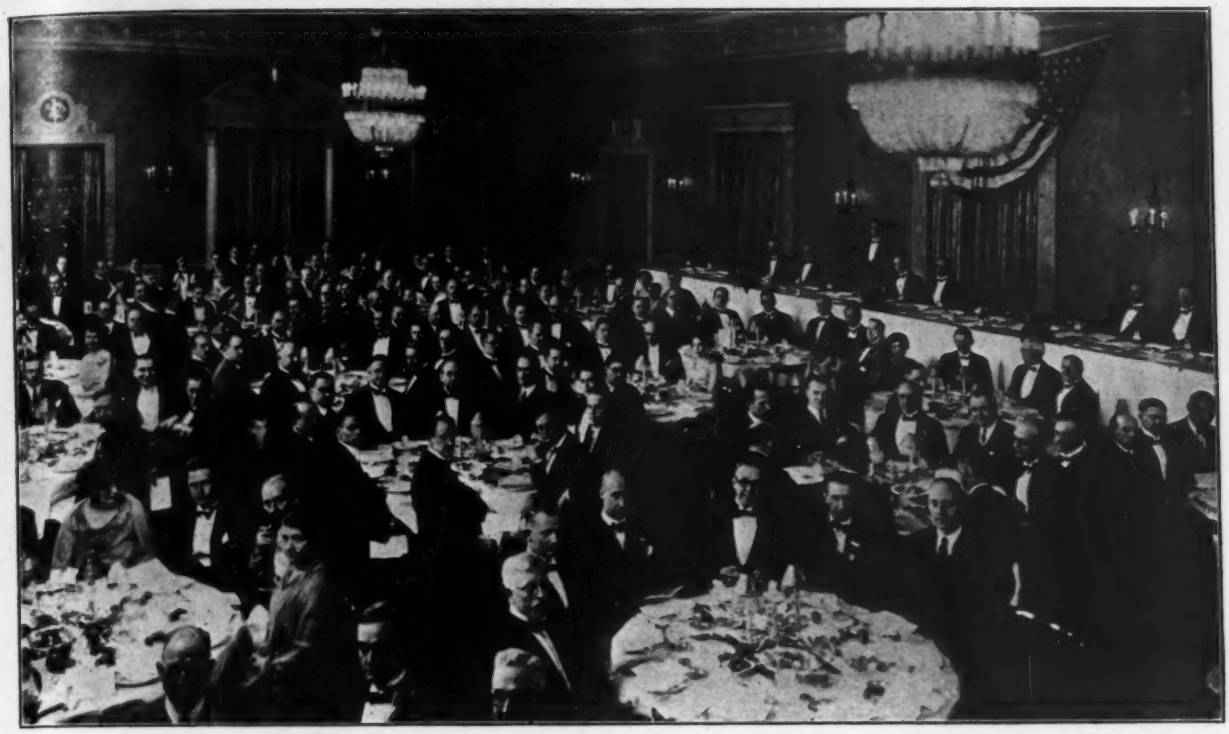
The Hon. Allen T. Treadway, of Massachusetts, was the next speaker. Mr. Treadway discussed some of the principal public questions of the day. "There are two features of interest in public questions," declared Mr. Treadway. "One, the general knowledge of national, state and local affairs that every good citizen should possess. The other, such special matters as directly affect their own livelihood. Every good citizen should possess both of these in order to intelligently judge to whom, as holders of public office, they desire to entrust their interests. In this way there is a very direct relationship between knowledge of public matters and individual interests of citizens.

"In other words, by study of the problems facing your own industry you are able to advise legislators as to the needs of your business, thereby creating a better opportunity to increase your sales and secure advanced prices. I can honestly say that during my term of service on the Committee on Ways and means no group of business people have had a more comprehensive knowledge of the needs of their industry than have those connected with the production of paper.

"A few years ago it was my privilege to participate in the rewriting of the Tariff Act, wherein I found there was a very decided personal interest shown by concerns with which you gentlemen are connected. The results in this instance were not all that everyone in the business would have liked, but they were so much better than conditions in the previous law that, combined with the other schedules, the paper industry felt fairly satisfied with the results. It brought about increased business



BANQUET OF THE SALESMEN'S ASSOCIATION OF THE PAPER INDUSTRY WALDORF-ASTORIA HOTEL



BANQUET OF THE SALESMEN'S ASSOCIATION OF THE PAPER INDUSTRY, HOTEL COMMODORE

prosperity which both directly and indirectly affected your interests.

"I want also to commend the intelligent conduct of the paper industry in watching out for the business welfare of its members. I refer to a report which recently reached me of the import committee of the paper industry, wherein it has watched the decisions of the board of appraisers and has protected the interest of home manufacturing against improper foreign competition and importation. If more industries guarded the home members as well as the paper people are doing, there would be less fault finding with numerous tariff schedules.

TECHNICAL ASSOCIATION DINNER

The Technical Association of the Pulp and Paper Industry held its eleventh annual dinner at the Hotel Commodore Tuesday evening, there being about two hundred in attendance. The only incident to mar the event was the receipt of a telegram from George V. McLaughlin, Police Commissioner of New York City, who was slated to be the principal speaker of the evening.

The telegram, which was read, announced that owning to a last minute interference with plans, the Commissioner would be unable to fulfil the engagement.

Toastmaster George K. Spence, with the mere announcement that the program was to be more or less informal, introduced as the first speaker Chief Engineer W. L. Stevenson, of the State Health Department of Pennsylvania.

Mr. Stevenson referred to the co-operation resolution the association had passed that day and said he believed this was the marking of a new era in the United States between governmental agencies and American industries. He declared that it stood to reason that a spirit of co-operation should rule because of the American love of fair play. The various state agencies faced many problems which touched industry and unless there was a co-operative spirit, both on the part of these agencies and on the part of industry, a spirit that was willing to give and take, there would continue to be antagonism.

Mr. Spence, in commenting on Mr. Stevenson's remarks, said he thought the state authorities would have little complaint to make of this industry in the future regarding stream pollution.

Joseph Mezo, a rapid fire teller of amusing stories, gave the gathering twenty minutes of pleasant relaxation.

There followed a demonstration of the Panatrope, a musical reproducing instrument which for the first time utilizes the electrical principle in the reproduction of sound. Three selections were played and the audience received them with enthusiasm.

Misss Mildred Enright, soprano, sang two selections, which were well received.

Rev. W. J. Johnston, of the Centenary Church of Montreal, was next introduced. He said he rejoiced in the fact that the international relations between Canada and this country were constantly growing stronger. Canada, on the outside, gave the impression of being very cold, but she had a very warm and loving heart within. He felt that there should not even be an imaginary line between the two countries.

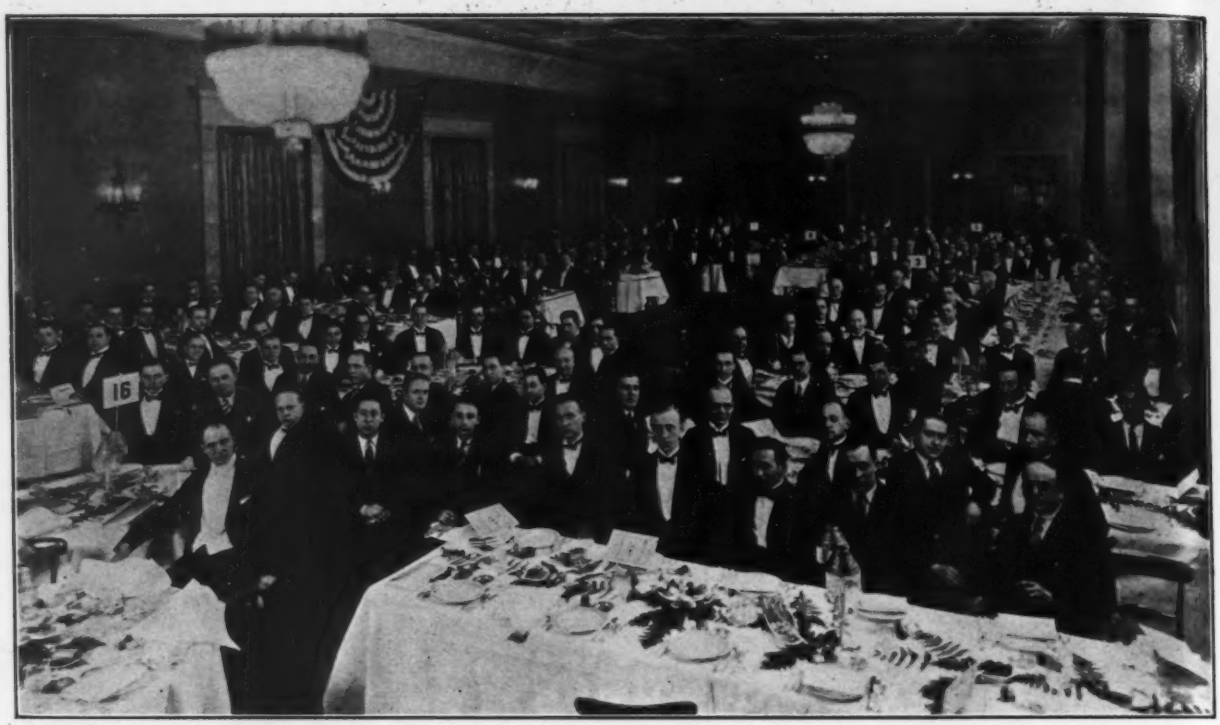
While wondering what to talk about, he said, it was brought to his attention that this association had been formed eleven years ago. The thought came to him that that was at a time when the world was war-racked. Men were bent on the destruction of each other, and yet at the same time men of vision were organizing in this splendid association to put their efforts to higher uses. It was that spirit and desire to put our brains and our muscles to higher uses that was going to eventually be the death of war.

The speaker told of the great reverence in which the name of Lincoln is held in Canada. "I believe," he said, "that Lincoln saw further, reached further and felt deeper than any man ever did. We believe in Canada that he was one of those souls which belong to the ages. He was too big for the United States alone, and we feel in Canada that he also belongs to us and the whole world."

In conclusion, the speaker said that civilization was not made strong by the military, but by the good and true men and women who could be trusted. He hoped that everyone would carry back to their respective communities from this convention the gospel

PICTURE TAKEN AT THE SIXTEENTH ANNUAL BANQUET OF THE NATIONAL PAPER TRADE

ASSOCIATION OF THE U. S. AT THE WALDORF-ASTORIA, WEDNESDAY EVENING, FEBRUARY 24, 1926



BANQUET OF NEW YORK ASSOCIATION OF DEALERS IN PAPER MILLS SUPPLIES, HOTEL COMMODORE.

of brightness, optimism and cheerfulness; the gospel of brotherhood, and the gospel of backbone.

J. L. A. Macdonald, a paper maker of Scotland, was introduced. He told of his appreciation of the warm welcome he has been accorded on his visit to this country, and he told the Technical Association that its activities were always being watched with interest on the other side. He told of the association they had in Scotland, which, he said, was modelled after this organization, and which was forging surely ahead, although it was forced to move more slowly. He said that civilization could not help but be benefitted when the different countries reached the point where they recognized more generously each other's views.

NATIONAL PAPER TRADE BANQUET

The sixteenth annual dinner of the National Paper Trade Association, held Wednesday evening in the Grand Ball Room of the Waldorf-Astoria, proved one of the most enjoyable in the history of the association.

This important occasion had many distinguishing features, and, as had been anticipated, was one of the outstanding events of paper week. Approximately 500 guests assembled and one and all thoroughly enjoyed all the good things provided.

Preceding the banquet, a reception was held, after which the assemblage marched to the Grand Ball Room and lost no time in locating their tables. Before taking their seats, all present sang "The Star Spangled Banner," accompanied by the orchestra.

At each plate there was an attractive menu containing the complete words of "America," a list of the officers of the Association, and a program of the entertainment features. During the repast, Conrad's Orchestra rendered old and new favorite airs with uncommon aplomb.

Following the dinner, an attractive entertainment from the B. F. Keith theatres, under the personal supervision of Frances Rockefeller, was presented. Snow, Columbus and McVey were recalled again and again for their smart songs and clever dancing. Incidentally, the gentleman who accompanied this act on the piano was a musician of the first water and earned a round of applause for himself. Bryson and Jones received a well deserved encore for their loose-limbed eccentric dancing.

Sweet melody was extracted by the Vaska Duo from the violin and the harp. The lady of the Duo also sang "I Never Knew" very effectively. Mary Haines worked hard to please her audience with songs and burlesque impersonations.

One of the most amusing items of the program was provided by an artist introduced as Senator Ford of Michigan, who humorously reviewed the topical events of the day, paying his respects to the World Court, the Income Tax, the Coal Strike, the Crime Wave, Prohibition, Automobile Drivers, the Woman of To-day, and other vital questions. His remarks and droll manner aroused roars of laughter from the audience.

After the entertainment was finished, "America" was played by the orchestra, all the assembly singing the refrain. Many of the guests then repaired to the Astor Gallery, where dancing was enjoyed until the "wee sma' hours of the morning."

Needless to say, the National Paper Trade Association has every reason to be gratified with the success of its sixteenth annual banquet.

WASTE MERCHANTS' BANQUET

The New York Association of Dealers in Paper Mills' Supplies, Inc., held its eighteenth annual banquet Wednesday night in the east ballroom of the Commodore Hotel and the event proved the most successful of the kind ever held by the association. The attendance was nearly three hundred, tables being reserved by the following concerns:

American Wollstock Company; Atterbury Brothers; D. Benedetto; Box Board and Lining Company; Jerry Brookman, Inc.; Vito G. Cantasano; James Carrano & Son; George Carrizzo Company; Darmstadt, Scott & Courtney; Economy Baler Company; J. S. Fisher, Inc.; Gaccione Brothers & Co.: E. J. Keller & Co.; A. C. Loveland Company; Leshner Paper Stock Company; Charles A. Mastronardi, Inc.; George W. Millar & Co., Inc.; A. J. Moran & Co., Inc.; National Association Waste Material Dealers; M. O'Meara & Co.; J. J. Patricoff & Co.; Republic Paper Stock Company; S. Silberman Company; United Raw Material Corporation; Wilson Paper Stock Company.

Credit for the success of the affair can very graciously be accorded to the hard working reception, journal and banquet committees.

The banquet committee was composed of Walter H. Martens, chairman; Charles Passannante and Alfred J. Moran.

The members of the journal committee were Joseph P. Gaccione, chairman; Joseph Benedette, Louis Markowitz, Dominick J. Palmieri, Alfred J. Moran.

The journal issued for the occasion was a most interesting souvenir. An entertaining revue was the feature of the evening and, as usual, long banquet speeches were omitted.

COST ASSOCIATION LUNCHEON

The Cost Association of the Paper Industry held its luncheon in Room 142, Wednesday noon, when more than fifty members assembled. Col. B. A. Franklin, of the executive committee, and of the Strathmore Paper Company, presided, and before introducing the speakers explained the aims and objects of the Cost Association.

Mortimer B. Lane, editor of the *Survey of Current Business*, Bureau of the Census, Department of Commerce, demonstrated the value of statistics as an aid to industry. We explained how the figures covering business movements were gathered by his department and showed the great importance of the data and survey charts to the business world in general.

J. W. Richmond, vice-president of the Irving Bank-Columbia Trust Company, New York, spoke on "What Your Banker Wants to Know About Your Statement," and shed much light on the problems which confront many manufacturers from time to time.

Mr. Richmond explained the importance of a careful audit by a conscientious accounting organization.

The last speaker at the luncheon was F. L. Stevens, president of the Stevens & Thompson Paper Company, of North Hoosick, New York, who discussed "Costs from an Executive Viewpoint," and gave the audience the benefit of his invaluable experience. Mr. Stevens remarked that the executive in buying materials must consider the state of the market in which he purchases, and also the condition in which he sells.

"Between these two points," said Mr. Stevens, come the manufacturing problems, and side by side with all of it ranges the financial status of the company he represents, that is, a time may come when it seems favorable to buy large quantities of supplies, but the finances for such purchases must be arranged, and sometimes he must forego what he considers favorable purchases in order not to load the inventory of his company unduly.

"In considering his selling, he must keep an eye constantly upon his cost, and unless he has complete confidence in the accuracy of the figures handed in to him by the cost department, he is more or less confused."

Mr. Stevens went on to compare the old with the new selling methods, greatly to the disparagement of the former. He declared that the modern cost system not only tells what other goods cost, but also the cost of marketing. It goes further and divides the processes of manufacture into several well defined groups, so that each stage of the manufacture can be judged as to its efficiency.

Another feature, which Mr. Stevens considers extremely valuable in the operation of cost accounting, and almost as valuable as any other point, is the constant information which can be disseminated through the organization as to the cost of certain operations. He stated that his organization had found it very advantageous to keep their superintendent and foremen of departments constantly informed as to how their department has been operating as to volume, quality and cost, during each period.

Mr. Stevens described the history of cost systems and showed how they had been developed. He praised the present "standard" or "budget" system, by which the cost of any operation, no matter how fine, can be worked in a little while, and showed how the users of the modern systems are constantly preparing themselves all the time to a fixed standard, knowing definitely whether they are going forward or retrograding.

WOODLANDS SECTION DINNER

There was a fine representation of New York and New England members at the dinner of the Woodlands Section held Wednesday night. George N. Ostrander, chairman of the Section, was toastmaster.

H. F. Heintzleman, Assistant District Forester, U. S. Forest Service, Juneau, Alaska, gave a splendid talk on the Alaskan situation, telling of its possibilities as a source of raw materials for the Paper Industry of the United States.

The other speaker was George F. Authier, a Washington correspondent who gave an illuminating talk on "The Journalist's Interest in Forests and Forestry."

PRESIDENT'S LUNCHEON

About twenty were present Thursday afternoon at the President's luncheon tendered by Norman W. Wilson, President of the American Paper and Pulp Association. There was an informal discussion of the various matters which had been brought up for consideration at the annual meeting and those present expressed themselves as particularly pleased with the plans that have been launched for a proper celebration of the fiftieth birthday of the association which will occur next year. Many valuable suggestions as to a proper observance of the occasion were made.

BINDERS BOARD LUNCHEON

The Binders Board Manufacturers Association held a luncheon on Thursday afternoon. No business was transacted at this event, but ideas were exchanged, and various matters of interest discussed. Those present voted the affair a thoroughly enjoyable and instructive function.

DINNER OF TISSUE MANUFACTURERS

The dinner of the Tissue Paper Manufacturers' Association was held at seven o'clock Tuesday night at the Hotel Astor. It was an informal affair without speakers. There were thirty-five in attendance.

UNITED PAPERBOARD PAYS DIVIDENDS

The United Paperboard Company declared a quarterly dividend of 50 cents on common, payable April 15 to stock of record April 1, placing stock on a $2 annual basis. Last dividend on common, and only one since 1921, was 50 cents declared in May and paid in July, 1925. A dividend of 6 per cent was declared on preferred, payable April 1 to stock of record March 15. The last previous dividend on preferred was 6 per cent., paid July 1, 1925.

KERR PAPER MILLS ADD ELECTRIC UNITS

In the Kerr Paper Company mills, Downingtown, Pa., there has been installed modern electrical devices for the perfection of operating facilities for the production of binders, trunk, air-dried straw and other board specialties. The electrical devices that have modernized the equipment are the General Electric Company's motor and generator.

UNION MILLS REMODELS MACHINES

Specializing on the production of insulating papers used for the manufacture of electrical cables, and sack and rope specialties, the Union Mills Paper Manufacturing Company, of New Hope, Pa., has recently modernized its mechanical units. The paper machines the units up-to-date.
have been thoroughly overhauled and modernized so as to bring

MANUFACTURERS IN CONVENTION

American Paper and Pulp Association Holds Forty-Ninth Annual Meeting at Waldorf-Astoria Hotel, New York

Norman W. Wilson, Vice President of the Hammermill Paper Co., Is Chosen to Succeed Himself As President of the Association—Vote is Passed to Appoint Committee From the Canadian Pulp and Paper Association on Such Matters as Are of Common Interest—Reports Show That Association Has Grown in Numbers and Influence—The Association Is to Prepare for Fiftieth Anniversary Next Year.

The fact that it took over three hours on Thursday to dispose of the business of the forty-ninth annual meeting of the American Paper and Pulp Association opened the eyes of the Association to the need of devoting all day to the annual meeting and, before the session was concluded, a resolution was adopted whereby next year there will be both morning and afternoon sessions.

The greater portion of the meeting was devoted to the reading of the routine reports and to a discussion of President Wilson's outline of plans for association activities during the coming year. The meeting formally endorsed the program as outlined and adopted a special resolution for the furtherance of research work. As the budget makes no provision for expenditures for industrial research, the resolution will make it possible for the executive committee to make such expenditures as may seem necessary, "if, as and when" it may seem advisable.

The nominating committee reported the following names for next year's officers, stating that the admirable record made by President Norman W. Wilson entitled him to re-election.

President—Norman W. Wilson, vice-president of the Hammermill Paper Company, Erie, Pa.

Vice-Presidents—Alex C. Gilman, Allied Paper Mills, Kalamazoo, Mich.; D. C. Everest, Marathon Paper Mills, Rothschild, Wis.

Executive Committee—W. M. Crane, Jr., Crane & Co., Dalton, Mass.; Herman Elsas, Continental Paper & Bag Mills Corporation, New York; Milton E. Marcuse, Bedford Pulp & Paper Company, Richmond, Va.; Hugh J. Chisholm, Oxford Paper Company, New York; W. L. Carter, Nashua Gummed and Coated Paper Company, Nashua, N. H.

The secretary was authorized to cast one ballot for these officers. President Wilson expressed his thanks and asked the association to give him a formal expression of their intention of meeting next year at the same time as The National Paper Trade Association. He was given that expression.

NORMAN W. WILSON, PRESIDENT

Secretary Baker announced that the association believed it could get along next year on the same budget as last year, which called for an appropriation of $55,000. The budget as thus outlined was approved and adopted.

A resolution of sorrow was adopted for the members who died during the past year, the assembly paying rising tribute to their memory.

President Wilson's report, which is published elsewhere, had suggested the appointment of a committee from the Association to consult with a similar committee from the Canadian association on such matters as were of common interest. The suggestion was approved and the president was empowered to appoint such a committee at his convenience.

The membership committee reported that the membership campaign conducted the past year had been successful and that the committee expected this year to get in the few large mills which are still not listed and a great many of the smaller mills.

The Simplification committee reported that it believed much constructive work had already been done but that it was only just beginning. It hoped, with the co-operation of the bureau at Washington, to make some recommendations during the present year.

C. A. Crocker, of Crocker, McElwain Company, Holyoke, Mass., a representative on the National Industrial Conference Board, told of the board's achievements during the year and said it was performing a most indispensable service.

W. C. Jordan, an economist, addressed the association at length on the trend of industry, illustrating his talk with numerous charts and diagrams.

All the routine reports were read and accepted. The treasurer's report showed that the total receipts of the fiscal year were $54,974.59, and the estimated expenses, $50,725.64.

President Wilson, at the close of the meeting, called attention to the fact that, although the meeting had been promptly

called to order at 10:30, the scheduled time, the session had prolonged itself for three hours. He said there were so many important matters to come before the association that it was getting where it would be necessary to meet earlier or hold a session in the morning and another in the afternoon.

The subject was discussed and a motion was finally made and seconded that next year the annual meeting be given two sessions. Reports and routine business will probably consume a morning session beginning at 10:30 and the election and important discussion may be reserved for an afternoon session beginning at 2 or 2:30 o'clock.

It was 1:40 when President Wilson declared the meeting adjourned.

PRESIDENT'S ADDRESS

Norman W. Wilson, president of the association, presented his annual address as follows:

We meet, at this the Forty-ninth Annual Convention of the A. P. & P. A., to review the more important developments of the past year and to lay plans for the future.

We have but one such opportunity in the entire year, and in order to make the most of it you find this a new type of meeting, in that only United States producers of Pulp and Paper, and Converting Companies, are present; in other words, our actual membership plus specially invited non-members whom we hope will be members in the near future.

The rights of the floor are, of course, confined to actual members.

This affords us an opportunity for frank discussion of all subjects which your Executive Committee has placed upon the program, or any subject which may be introduced from the floor.

So that you may know the topics programmed by the Executive Committee, we have prepared this painted order of business large enough for all to see.

Broadly Representative

Due to the excellent work of the Membership Committee, and the cordial reception accorded them by former non-member mills, the Association is now more broadly representative of the Industry than for some time past. It is more representative of large, medium and small tonnage mills and of grades of practically all classifications.

Due to increased revenue from the new members, increased annual dues from some of the old members, and able management by the Executive Secretary and his staff, we have been able to live within our income and within the budget set up last year.

As the meeting develops, you will receive formal reports of what has been done during the past year. These reports will bear upon special matters.

In consultation with secretaries of the affiliated groups, it was decided not to have reports from each of them because those particularly interested have already had the opportunity to receive such report in the annual meeting of each organized group.

Association Activities

I have found, from my contact with the Association, that there is a veritable stream of correspondence, telegrams, local and long distance telephone calls being handled at association headquarters ably, promptly, and to the satisfaction of our members, so far as I am able to judge. There are conferences, business luncheons and dinners outside of the industry itself, and yet closely enough related so that cordial contact should be maintained.

Dr. Baker, Mr. Porter, Mr. MacNaughton and Mr. Burke take care of these responsibilities day and night. You have a real business organization at 18 East 41st Street. It was that way before I came into the Presidency and we should increase in efficiency year by year.

This, I have observed—and I presume it is true in all associations—that some of the organized groups, holding membership in the A. P. & P. A., make constant, intelligent use of our equipment, our organization, our files—in fact our entire resources; while some of the organized groups take far less advantage of their opportunity.

Again this is true, and perhaps even more pronouncedly, with the individual members. Some regularly visit the Association offices and tap our resources by mail and wire. On the other hand, there are some members from whom we hardly hear from one annual meeting to another, with the exception of the payment of dues and such matters of formality.

Please bear in mind that this is your Association, being operated by your funds, and the management is anxious to have each member company and each organization member obtain the greatest possible return upon its investment in the Association.

Your Executive Committee and Dr. Baker are trying very hard to avoid sending to you communications of minor importance or of small interest; at the same time they are striving to be alive to every worth-while matter that should be placed before you, recognizing that in some cases only part of the membership will be benefited but usually including all of the membership on our mailing list rather than risk that some, who might be benefited, should be neglected.

Central Organization Necessary

Back in 1878, the pioneers of this Industry, years ahead of many other industries, decided that a central organization was necessary for the success of the businesses in which they were engaged. During the quarter century which is just concluded, this principle has been recognized and adopted by practically every industry of account. It is now recognized that when American business men invest their money and their time in the production of a commodity, they do not enter upon merely local or even domestic commerce. They participate in world trade, whether or not such is their intention and desire. It therefore follows that they must know not only what is going on throughout this great country in the production and distribution of the same and similar products, but also to what extent their product is being produced and consumed in all other parts of the world.

They must also be informed regarding their relationship to other industries, and here again they must have international as well as national contacts.

No industry can afford to depend upon disinterested parties to take care of its problems—industrial, financial, political and social.

If your officers and executive committee properly sense your convictions and your wishes, the Industry here assembled recognizes, as it has not for years, the need for a central organization and the need for organization embracing each branch of the Industry. The centralized organization with a united front must take care of problems important to the Industry at large, but each branch of the Industry should also be organized in order to effectively take care of problems that may arise more intimately concerning it than other branches of the Industry.

I will go further in saying that if your convictions and wishes are properly sensed, the Industry is in a cordial, responsive mood to forget small prejudices and to harmoniously and enthusiastically carry on constructive co-operative work.

Promoting Welfare of Industry

The work of this Association, obviously, is to promote the welfare of the Industry at large.

As an illustration of how we are striving in this direction, may I explain that without exception our aim is to deal with each problem in the following fashion:

If action of one sort or another is desired by any member or group of members, a sincere effort is made to discover how the balance of the Industry is affected.

If it can be established that the action is desirable to all, immediate action is attempted.

If it develops that the action is important to only part of the

membership, but is not harmful to the balance of the membership, action is likewise attempted.

If a division of interest is discovered, action is not taken immediately, but an effort made to get the conflicting interests together, and if the advantage to one group is balanced or outweighed by disadvantage to others, then it is recognized that the Association should maintain a neutral position, taking no action either for or against the project. (The attitude on Postal Law is a good illustration of neutral position.)

Naturally, a position of neutrality, assumed by the Association, leaves each member or group free to follow its own best judgment on the matter in hand.

Want to Obtain Facts

Our outstanding desire is to obtain the facts and after they are obtained, to promptly assume our position, either positive, negative or neutral.

This particular method of functioning is not covered in our by-laws—to my knowledge, it has never been formally adopted by the Association or the Executive Committee. However, I believe it has been the Association's policy, for years back, and I mention it here for the benefit of new members and old, as indicating the spirit of fairness and soundness which governs the work of the staff and the present officers.

With the broader membership we now enjoy, we are fairly well able to quickly get the facts upon almost any subject. However, to operate at highest efficiency we must have even more thorough membership than we now enjoy, and we ask that our non-member guests, today present, extend to our membership committee the broadest consideration of which they are capable.

Usually, at the opening of an annual meeting, reference is made to business conditions of the previous year and the prospect for the new year. Our annual meeting comes at the conclusion of the meetings of almost all of the organized groups. I presume you have all attended one or more of these meetings and you have had private contact with each other and with your customers, so that any lengthy comments at this time would be out of place. However, we can afford to take sufficient time to observe that the trend of events is increasing toward International Peace and harmony and especially since the Locarno Pact and our recent entry into the World Court.

Foreign Competition Increasing

The trend is also toward the re-establishment of international credit, due to the success of the Dawes plan, the general return to gold standard, the funding of debts, etc.

All of these tend to increase the production and, therefore, the competitive power of foreign nations. They also tend to increase their purchasing power and, therefore, the consumptive power of the world market, the foreign standards of living will be enhanced, their labor rates increased, and economists agree that we will be helped more than we are hurt.

The world trend is away from radicalism and back toward sanity, even and including Russia.

It is comforting to observe to what extent this is true in our own country. During the war it was necessary for the Government to assume a bureaucratic attitude in a great many respects. Our Chief Executives and our principal Governmental Departments now, frankly and cheerfully, consider themselves the servants of the Public.

As a particular illustration, observe the Department of Commerce. Mr. Hoover has personally said to your Committees that he is employed by the business people of this country, and it is his duty to conduct himself and his great Department in accordance with the wishes of American business, always, of course, consistent with sound practices as indicated by the mass of information at the Department's disposal and the practical experience of Mr. Hoover and his assistants.

During the war the Government was forced into private business. Our Chief Executives are quite willing to be forced out of private enterprise and I believe can be counted upon to help bring it about.

Observe the fashion in which Congress, influenced by public opinion, has decided to eliminate the publicity clause from the new tax bill.

Observe the courageous prompt action of Secretary of State Kellogg in connection with undesirable foreign politicians.

Congress has provided laws which define who is welcome and who is not. We can be thankful that the present Administration proposes to enforce this Law.

While on this subject, let us, in this industry, pay more attention than we have in the past to what is being taught in our schools and universities. It is unthinkable that we shall send our sons and daughters to institutions, encouraging or allowing the teaching of political doctrines that are dangerous both to society and to state.

DR. HUGH P. BAKER, SECRETARY

Our sound thinkers must observe with satisfaction the demonstration of working women in Washington last month, asking that they be safeguarded from well meaning but misguided friends who seek to protect them, but who really make it impossible for working women themselves to have any influence upon what work they desire to do, what work they can do, and when they shall be allowed to do it.

Another Hopeful Sign

Another hopeful sign is that Railroad baiting is on the decline. Let me briefly quote General Atterbury at a dinner to the President and Directors of the Pennsylvania System recently held in Pittsburgh:

"The railroad skies are clearing. We have been through some rough weather, but it seems to me now that clearer weather is ahead of us I think that if this can be attributed to one cause

above all others, it is that there is less suspicion abroad, more faith in men, a more general belief on the part of the public that railroad officers can be trusted."

We are coming to understand each other better in this country. I am reminded of an editorial appearing recently in one of our most constructive newspapers. It dealt with the fact that during the past five or six years we have neglected to keep as closely informed as we should on some of our intersectional problems within this country. It is important that we know what is going on abroad and that we take reasonable steps to help maintain peace between our foreign friends, but in so doing, we must not fail to know even better what is needed within this country to maintain harmony, and to try to help to solve the particular problem of any section or group that finds itself in difficulties. The North must understand the problems of the South; the East, the problems of the West; the Manufacturer the problems of the Farmer, so that, not as blocks, but as a Nation we may find prosperity and happiness.

This we should bear in mind in our Senatorial selections this fall.

Importance of Commerce

We cannot appreciate too much the present Administration's recognition of the importance of commerce to our national life, of its encouragement to the development of our commerce, thus increasing our national income and the income of the Federal Government, while at the same time President Coolidge has insisted upon the curtailment of the cost of Federal Government; through the expansion of income and this cutting of cost, more rapid strides are being made in the decrease of our national debt, simultaneous with the decrease of our Federal taxes than had been thought possible. This attitude of the Government is tremendously far reaching, as it will eventually influence State and Municipal Governmental cost and point the way to the corporation and to the individual as to how best to conduct our financial affairs.

So much for the policies being followed by our chief executives. There can be no question that the country is wonderfully prosperous, that our purchasing power is better balanced than for years, that production and distribution costs have been shaken down to a point that enables us to continue to successfully compete with foreign nations.

When the Important Committee was formed, we were being handicapped with foreign made paper gaining access, improperly classified and under valued, and therefore avoiding duty properly assessable under our present Tariff Act. Excellent work has been done by that committee, and the situation is much improved. However, much is still to be done, and every one of our members should give wholehearted support to the work and to the sharing of the cost.

In view of apprehensions continually expressed that Europe will overrun America with manufactured goods, it is noteworthy that the most important change in last year's imports was an increase of nearly $500,000,000 in raw materials, while the most important change in our exports was an increase of nearly $250,000,000 in finished manufactures. Our takings of foreign manufacturers were only 18.8 per cent of our total imports, while our exports of manufactures were 38.2 per cent of all exports. The amount of finished manufactures which we sold in the markets of the world in free competition with all rivals was more than double the amount of manufactures imported.

The tax cut now being arranged will have further helpful influence.

Over Production

There has been a good deal said about over-production in industry at large. The history of commerce shows that there is no way of maintaining an absolutely level balance between production and consumption for any extended period of time. In the past the scale has swung backwards and forwards, at one time consumption being ahead of production and at another time production ahead of consumption. Then, in addition to the law of supply and demand have been many other elements that make for prosperity or depression. Is it not obvious that this will continue to be the case? The only time that there is an exact balance between supply and demand is when the pendulum happens to swing across dead center on its way to or from one of the other peaks.

The comforting part of it is that the world, and I think this country in particular, is obtaining the facts with ever increasing rapidity and thoroughness. True, this reduces the opportunity for speculative gain, but it likewise reduces the danger of great losses.

Sharp Dangers for Capital

There are sharp dangers for invested capital in new processes, new equipment, new methods, but here again the American business man is learning to keep pace with these developments and to shape his affairs successfully in spite of these new developments, and in fact aided by them.

It is to be expected that new capital will come into our present industries more rapidly than we like to see, particularly when such capital is invested by a competitor, old or new, but this must be expected in a country that is so tremendously wealthy as ours.

Let us not lose sight of the fact that in addition to the new capital which comes into our existing industries, tremendous investments are coming into new industries, new merchandise, new commodities, new luxuries, and these in turn bring about an increase in consumption of our existing industrials so that the old rates of increased demand are far outrun by the new rates.

For months fears have been expressed because of over-production in the building industry. The last figures which I have seen are for December, and if I understand these figures, they constitute a new high record for the tenth consecutive month.

The bulletin issued by the National City Bank of New York comments that at the beginning of 1925 no one would have dared to predict that the year would end with more construction work in sight than there was at the beginning of the year, and yet this is exactly what did occur. Authorities on the subject now say that the present period of building activity is unlike any preceding one, in that never before has there been so great a change in the class of habitation wanted.

These authorities say that the present demand for houses is not simply to provide for an increase of population, but to meet a general demand for a different class of habitation, and that the new houses will be built and occupied even though the old ones are abandoned.

Improvement Programs

This bulletin also calls attention to the fact that throughout the country it is becoming absolutely necessary to develop more or less extensive city improvement programs; as illustrations, they cite the tremendous program of New York City in the building of bridges, tunnels and connecting railways; the big program that is being put through by the City of Chicago, etc.

They summarize by saying that old city plans are out of date just as industrial plant equipment gets out of date; that extension or replacement of this old equipment will occur involving tremendous investments but resulting in a higher degree of efficiency and comfort, thoroughly justifying the expenditures.

In my opinion, the general volume of business in this country will increase in just as great proportion during the next five years as it has during the last four years. I mention the last four years, as 1921 was a low peak and therefore should not be included in this calculation.

Over Production Fifty Years Ago

In our own industry there is concern, and properly so, because of over-production. Dr. Baker recently called my attention to the By-laws of our own Association, formed nearly fifty years ago, and it is not only interesting, but tremendously significant, that one of the principal reasons, if not the principal reason for forming the Association, was because of over-production which existed at that time. Our invested capital now must be a thousand

fold what it was then, and yet new money is still coming into the industry and the sheriff is still a stranger to most of us.

Please do not gain the impression that we take this situation lightly. On the contrary, we take it so seriously that some months ago the Executive Committee gave particular consideration to the advisability of the appointment of a small but very thoroughly informed Committee, whose duty it would be to advise whenever new or additional units of pulp or paper making are contemplated in this country, and who would be thoroughly posted about the relationship between the supply and demand of that character of product to be produced by the new or additional units.

Government Protection

The Executive Committee decided that under our present laws, the Association could not conduct this type of work, but it is to be noted that a very prominent Government official of Canada has recently remarked that it may become necessary for Canada to give some form of protection to capital already invested as against capital to be invested in the pulp and paper industry in that country.

Three Necessary Elements

For the present, we must manage without this type of service, and we can manage in each branch of the Industry that is properly organized and functioning, at least with respect to capital expenditure in our own membership. I shall try to point the way.

Yesterday, at the luncheon of the Cost Association, there were three speakers: Mr. Lane, of the Department of Commerce, who dealt with statistics; Mr. Richmond, of the Irving Bank-Columbia Trust Company, who spoke on finance and particularly the need for each company to have regular audits by reliable auditing companies; Mr. Frank Stevens, of Stevens and Thompson, on Costs and their executive application.

Here we have the three necessary elements. With the proper statistical knowledge of the existing total production of any one of our grades, the existing demand for that grade, the stocks on hand, all available to any group properly organized, the knowledge of our production, cost of that grade and the prices obtainable, any company can, with the proper appreciation of its ability or disability to adequately finance an extension of output, determine with intelligence whether to extend or not to extend. It can do more. With full statistical knowledge, cost knowledge and financial advice, it can determine what its sole policy should be.

But unless the fullest knowledge and consideration of all three of these elements are obtained and used, the individual mill can neither conduct the distribution of its existing output with complete intelligence, nor can it properly deal with the subject of capital expenditures.

At the present time, only one quarter of our members are taking advantage of the Cost Association, and I urge that this be corrected. I also urge that leaders in the unorganized groups bring about organization so that they may have access to accurate, reliable statistics at all times.

At this point I am reminded of an editorial which appeared last month in the New York *Commercial*, a publication which we can all afford to read religiously and to patronize. I would like to quote part of this article.

"Science and engineering have taken command—with the result that we are entering upon an era of industrial expansion and activity without parallel in history. This contention is supported by evidence on every hand. Never have we had so much on the constructive side of the ledger to contribute to optimism. So true is this that the manufacturer, wholesaler, jobber or retailer who does not make money during 1926 will have only himself to blame. Let no one believe, however, that the business prosperity that is most certainly here to stay will bestow its fruits upon every one wishing for endowment. As never before, hard work and vision are prime essentials to profit."

The *Commercial* has expressed better than I can my opinion of what lies before us for 1926 and how we must conduct ourselves in order to participate in today's opportunities.

Must Press Forward

This industry must press forward, working closely with the Department of Commerce for further simplification and standardization, in the elimination of waste in production, in the sturdy effort now being made by the Department to ascertain the reasons for the high cost of distribution and the development of relief in this high cost. Those services that are sensible and economically sound must be maintained and perhaps expanded. Those services now being rendered which are unreasonable, too costly for the benefits derived, excess duplication of effort, etc., must be reduced or eliminated where they cannot stand upon their own feet.

Our principal raw materials must be given greater consideration. There must be found ways and means to extend the supply of old and new rags, of pulpwood and other known pulp making material. Research and experiment must develop new raw materials of this nature and particularly that type of wood still growing in abundance which we have not yet learned to utilize.

Research Work in Canada

We admire Canada's determination to excel in the research field. It is significant that at the recent annual meeting of the Canadian Pulp and Paper Association ways and means were further developed for the construction of a laboratory, probably superior to any now existing in the pulp and paper industry of any country. The estimated cost of this structure is $350,000. There are three parties to the plan: (a) Dominion Government; (b) Canadian Pulp and Paper Association; (c) McGill University.

The Dominion Government is contributing $35,000 annually through the Forest Products Laboratory.

The Canadian Pulp and Paper Association not less than $25,000 annually, plus a direct contribution of $7,500 annually in support of a chair of Industrial and Cellulose Chemistry at McGill University.

The actual commitment of the Canadian Association for this work alone during 1926 was fixed at their last meeting at $50,000. This figure is almost equal to our entire yearly budget.

The expressed determination of our Canadian friends is to make Montreal the world center for cellulose research and to make Canada the pulp and paper producing country of the world. The present and future captains of the pulp and paper industry of this country can well afford to study this plan. Our problem is in some respects far more difficult and perhaps particularly so because our industry and its allied units rate but fifth in actual money invested and sales volume, while in Canada the industry stands first in its recognized future volume. However, our industry in this country is still very much larger than Canada's, and in importance to the Nation rates second to none.

Too Many Diversified Fields

Another handicap to us is that our industry has been developed into so many diversified fields. While our production in practically each of these fields exceeds the volume of each of our foreign competitors, the diversity of our products naturally tends to a diversity of interest to an extent that has at times caused almost a clashing of interests within the industry and a division rather than a unity of purpose.

This is less true at the present than at the conclusion of the World War and the crucial period of severe readjustment which immediately followed.

Your officers and executive committee, however, feel that it is a subject which must have your devoted attention, and we appeal to the intelligence, the manhood and the patriotism of the industry to the end that the permanent good of the industry as a whole never be lost sight of in any transaction by any individual, any group, or the membership as a whole.

I have spoken about some of our handicaps. Let us not lose sight of the one particular advantage which we have, namely, that we are producing principally for our own market. It is to be assumed that this important fact is sometimes overlooked by our Canadian friends.

You will recall that at the annual dinner of the Canadian Pulp and Paper Association, Prime Minister Taschereau remarked that "If Americans object to an embargo on pulpwood from private lands, the way to prevent such an embargo is to give free entry to all paper entering United States from Canada."

The industry in the United States is trying hard to understand the viewpoint of those of our Canadian friends who may have such an idea in mind. We desire to understand so that we may take no action and make no comment that is unjust.

In the first place, to give free entry into the United States of all paper from Canada would mean to give free entry into the United States of all paper produced in the entire outside world.

An Extraordinary Step

This would be an extraordinary step even to contemplate when it is borne in mind that practically all industry in the United States has been established and developed, based upon a protective tariff. Obviously, we could not maintain our equilibrium with other domestic industries unless accorded the same protection that is accorded to them. The logical sequence of Mr. Taschereau's suggestion would therefore amount to a recommendation that the United States remove all tariff protection to all industries existing here, and it is hardly to be expected that this will come to pass in our day and generation. However, Mr. Taschereau has opened a subject to which our attention can properly and profitably be devoted. With this in mind let us consider the commercial relationship between Canada and the United States concerning pulpwood, pulp and paper.

According to the latest figures which we have been able to assemble, Canada exported to the United States during 1925 1,486,968 cords of pulp wood; 285,058 tons of mechanical pulp; 421,183 tons of unbleached chemical; 153,648 tons of bleached chemical, and 1,295,324 tons of news print.

Canada Paid Not One Cent of Duty

Canadian manufacturers paid not one cent of duty to get all of that tonnage of pulp and paper out of the Dominion, nor did this country charge her one cent in allowing it to come in here.

And yet had we sold to Canada the tonnage of news print which she sold to us, Canadian producers and their pulp and paper making employees would have been protected to the extent of approximately $20,000,000 and the Dominion Government finances enhanced to that extent for the reason that Canada protects her own news print industry with a 25 per cent tariff wall.

It has recently been intimated that Canada is doing us quite a favor when she sells us pulp and that eventually she may decide to discontinue doing so.

Perhaps you have read an article by Mr. Bretherton of the *London Morning Post*, from which I quote:

"The United States has no pulpwood for its pulp factories, no pulp for its paper factories, and no paper for its news and other needs unless Canada obliges. So plenty of American capital is forthcoming to buy Canadian pulpwood, if Canada allows it to be exported, to buy wood pulp if Canada prohibits the exports of the wood, and to buy Canadian paper if Canada prohibits the export of both wood and pulp."

I shall not attempt to paint a disturbing picture of what the outcome of such a policy would be, principally because it seems so very unlikely that the intelligence and integrity of Canada can be upset by a relatively few of her citizens.

Canada's Paper Imports

With respect to Canada's attitude toward paper imported into that country, I wish to quote an article which appeared in the *Montreal Gazette*, January 30, quoting a speech made at the annual meeting of the Canadian Association:

"The question of imports of paper into Canada continues to give concern to several of our sections. These imports which average ten million dollars annually in value more than offset our exports of all paper other than news print. Much of the importation is quite unnecessary and should be replaced by increased consumption of Canadian paper.

"In this connection the Produced-in-Canada campaign carried on by the Canadian Manufacturers Association is effecting good results by educating Canadian consumers on the advantages of patronizing home industry. The campaign is receiving the practical as well as moral support of our members."

Mr. Taschereau's suggestion might seem perfectly reasonable to the casual observer, but when the above facts are taken into consideration it would seem that so far as the pulp and paper industry is concerned, the United States has already favored Canada to a tremendous extent.

Another feature that is entitled to consideration is that almost our entire domestic production of pulp and paper is consumed right here in this country. If we were obtaining raw materials from foreign countries, and after converting these materials into finished paper, depriving the countries from which we obtained them of their own market of finished goods, the situation would be somewhat different. However, these are not the circumstances. We in this country have devoted years to extensive study of the development of our market. It is our research work in laboratory, sales and advertising departments which has provided the knowledge and our funds that have been spent to teach the American business man and the public at large the improved functions of business and social life through the intelligent use of an ever increasing amount of paper.

Not a Matter of Chance

It is not a matter of chance that the per capita consumption of paper in this country far exceeds that of our nearest rivals. This per capita consumption is rather the result of business education, paid for by the intelligence, the toil and the money of our own citizens and especially of our own industry.

Having these points in mind we feel that our industry has justified its existence and that it will continue to do so.

Naturally, we feel that we have more right to serve this market than any of our friends from abroad, whose principal expenditure thus far has been directed toward the production of competitive material with the principal object in view, consciously or unconsciously, of taking from us the market in which we have invested so much.

The growth of the Canadian pulp and news print industry reads almost like a fairy tale. Her own requirements are relatively small, so that most of her production is exported, and almost all of this exported tonnage is taken by the United States.

Having certain of these facts in mind, we who are engaged in the production of pulp and paper in the United States, feel that in both Canada and the United States the most careful thought should be given to avoid action by either country that will set up barriers, and we further feel that every effort should be made to develop ways in which we can jointly set up a program by means of which both countries can be guaranteed a future supply of the necessary raw materials.

Committee Should Be Appointed

Without attempting to influence Canada's future attitude toward those problems, upon which her interests and ours might seem to diverge, or even clash, your president recommends that authority be given to appoint a committee composed of our best informed, broadest thinking men, and that an invitation be extended to the Canadian Pulp and Paper Association to appoint a like committee; these two committees to confer for the sole purpose of (1) attempting to define those subjects upon which our interests do not clash and having defined them (2) attempting to bring about joint co-operative action for the good of the industry in both countries.

As an outstanding opportunity we reiterate what has been said by reputable foresters and other recognized authorities, both in Canada and in the United States, regarding the prevention of forest fires, the control and prevention of insect attack and diseases common to the standing tree, absolutely efficient cutting practices and finally the growth of new wood.

Federal and State aid must be acquired in this country; Dominion and Provincial aid in Canada. Then there will be individual support by those directly interested, and your president further recommends that the Association be authorized to advocate that if proper Federal and State aid is extended toward the preservation of our forest stands and toward the regrowth on cleared land, that a replenishment charge be assessed against each cord of wood cut, the money so obtained to be expended by a National Committee to guarantee future production of wood, consistent with future requirements.

Fiftieth Anniversary Next Year

In closing, may I direct your attention to the fact that our next annual meeting will commemorate the fiftieth anniversary of the A. P. & P. A. Dr. Baker has already given the occasion a good deal of thought. With the conclusion of this meeting, it is proposed that we immediately appoint a committee to develop with Dr. Baker plans for the celebration of what may well be called our "Golden Jubilee." The occasion should receive fitting recognition; preparation for it should engender an enthusiasm for our work throughout the year and tend to decrease the magnitude of any problem that may confront us.

I trust that we will keep the occasion constantly in mind, that each member will present any recommendations which occur to him for perfecting of the Jubilee plans so that the occasion may be made a credit to the industry and indeed to the nation.

REPORT OF SECRETARY

Dr. Hugh P. Baker, the executive secretary of the Association, presented his annual report, as follows:

With the exception of one or two grades of paper, the year 1926 was a more satisfactory one in the paper industry, generally speaking, than any year since 1920. Production was maintained on an unusual level and profits were fair. Over-production continues and will continue as a deterrent to both price and profit. There is little consolation in the fact that the other great industries of the country are suffering from the same ailment. It is difficult indeed to see much light through the cloud of over-production which darkens the prospect in a number of grades in the industry.

Many manufacturers in the paper industry, and in other industries, seem loath even to discuss the serious economic problem of over-production for fear that a frank, honest discussion of the particular economic problem might make the government or someone else think that the discussion is one of restriction of production rather than an economic question which must be faced by every business man as freely as by the economists, and by the heads of executive departments at Washington, who are so much interested in the general business of the country. It is not difficult to understand why manufacturers at times feel that over-production is a skeleton in the closet which cannot be gotten rid of and must be kept out of sight and out of discussion, in view of the attitude of some of our lawmakers. It seems manifestly absurd that men whom we have called upon to direct the business affairs of the government should frown upon an honest attempt on the part of a group of manufacturers to face the problem of over-production or over-expansion, with the hope of a settlement that would be wholesome and healthy, not only for the industry concerned, but for the general business of the country.

Paper Industry Has Grown Without Conscious Direction

Reference has been made in previous reports of the secretary to the fact that the paper industry has apparently grown, like Topsy, without conscious direction either by the executives of the industry or by the banks financing the industry. It is sound and reasonable to assume that the industry is not only interested in its future development, but has a right to exercise conscious direction of the growth of the industry, always providing that this direction is within the limitations of the law. Not until the industry does recognize the problem of over-production or over-expansion and future development as a problem of as great importance as production and distribution, will the industry be on a satisfactory and stable basis.

It is inconceivable that the government should question in any way the right of this industry, through its central organization, the American Paper and Pulp Association, to study its over-production problem, to present frankly the facts determined, and to discuss these facts within the industry and with departmental heads at Washington. The bankers of the country should welcome such an analysis and such frank discussion, and it is hoped that the industry will see its way clear to carry through a careful study of alll the factors, from raw material supply through production, distribution and financing, to see if it may not cure its own ills as any business man is expected to analyze his own problems and direct his activities on the basis of a knowledge of his conditions and his opportunities.

The Raw Material Situation

No industry can be said to be on a stable and permanent basis which is not assured of a satisfactory and continuous supply of raw materials. During the past year the principal raw materials for the paper industry, that is, wood and rags, have been easily available at reasonable prices, and though there may be some evidence of stiffening in price of wood and pulp, particularly during the coming year, there is no evidence that the industry will not be able to satisfy its own raw material needs in a reasonable way during the next year or the next five years.

Important if not profound changes have been taking place in the use of raw materials in the industry during the past fifteen years. One has but to consider the relation of the fine paper industry to the use of wood, pulp and rags, during the past decade, to appreciate these changes. It is significant that the industry has come to the use of the hard woods—beech, birch and maple—for pulp. The use of these last mentioned woods, with increasing use of Southern pine and certain of the little used Western woods, promises still greater change in the industry in the next decade. It is significant also that the mills using such substitutes as straw have opened a testing laboratory of their own, taking an expert from the U. S. Forest Products Laboratory at Madison to study their problems. There would seem to be little chance, however, for substitutes of any kind replacing generally the use of wood and rags in the paper industry.

The Woodlands Section of the Association, in employing a trained forester and in carrying on through that forester a study of pulpwood conditions in the different papermaking regions, is making a very constructive and valuable contribution to the solution of the raw material problem. The report of the Association's forester, D. A. Crocker, on "The Pulpwood Situation in the Lake States," is just now available for distribution. This report is so significant that there should be no question of funds for the continuation of Mr. Crocker's work in the forest areas of the other papermaking sections, to be followed by assistance to individual mills or groups of mills which now own or control timberlands or which may be considering the acquirement of lands for the production of pulpwood.

Wood has been too cheap, through the years of use of American forests, to have justified the expense of properly protecting and managing standing forests, to say nothing of producing new crops of wood. The time is now here, however, when the cost of wood has passed the cost of production and it is economically sound for the wood-using industries to produce wood as a crop, just as other crops are produced from the soil. After all, the paper industry is a wood-using industry, and if it is continued on a stable and permanent basis in this country it must within itself attack the forestry problem, and solve it in so far as it applies to the production of pulpwood. The industry has a real opportunity to assume aggressive leadership, through the Woodlands Section, in the growing of timber for its fundamental raw material. Corrective changes are taking place in the protection of forests from fire and in forest taxation that now make it possible in some of the states

for the timberland owners to put their lands onto the basis of continuous forest production and that at an assured profit.

Association on a Sound Financial Basis

The annual report on the financial affairs of the association indicates that it is a going institution, on a sound financial basis. It was able for the first time in a number of years, with the assistance of a group of executives who have given freely of their time in the furtherance of association work, to close the fiscal year on March 31, 1925, with a substantial reserve. Through careful planning and economy this reserve has been increased somewhat during the present year, so that the industry is now approaching a condition permitting it to meet emergency expenditure of funds. There as every reason for the association maintaining a reasonable reserve, in fact, the industry owes it to itself to maintain a reserve fund in the association of a size to meet needs for special work of any kind, either through the association or special committees. Not until this is done will be the industry be free of repeated calls for assistance to this activity or that. The industry as a whole should meet its own emergency needs, and there is no one who would question the fact that a strong reserve is the fairest and most equitable way for the industry to meet any routine or emergency problem of research, of education, or of legislation.

The fact that the association is on a sound financial basis has increased the morale and thereby the usefulness of the staff of the association. An increased membership, making the association representative as never before of the entire industry, emphasizes to your officers and the staff not only their opportunities but their obligations. With a product, the annual value of which is more than a billion dollars, it should not be necessary to restrict the central organization of the industry to an income of its present limited amount, thereby making it necessary to raise from time to time special funds for special activities. The association sees clearly opportunities for more effective work along lines of a statistical and economic service, along research lines, in sound and helpful publicity for the industry, helpful contracts with the government, with other industries and abroad, and it feels that it has proven its ability to meet these opportunities, could the industry but have confidence in giving it more adequate support. The industry is giving piecemeal support to a number of different activities. Stronger support for centralized activity should prevent duplication and make for greater economy and coordination and more valuable results to all concerned.

Coordination of Organized Activities in the Industry

Since the development of the association as an organization of affiliated associations there has never been as satisfactory coordination of activities of the various associations as there is today. It is not out of place to say that the industry is fortunate in having an able group of secretaries serving the various associations. These men understand each other and are working in a very harmonious way for the upbuilding of their organizations and the strengthening of the service of their respective organizations to their membership.

It would be helpful if means could be developed whereby the secretaries of all the associations serving the industry, whether the associations are affiliated with American Paper and Pulp or not, could be brought together monthly or quarterly as a planning board for the furtherance of worthwhile organized effort for the industry. The interest of manufacturers making up the various associations in this matter would go far in making it possible to maintain closer personal contact between the secretaries in the industry.

With economic conditions becoming more complex and more competitive rather than less, and with common research and legislative problems arising among all of the groups of the larger paper industry, it should become more clearly apparent that there is need for close co-operation not only among the associations serving manufacturers and converters, but among those associations and those serving the industry in the supplying of raw materials of all kinds, and those distributing the products of the industry. Factors affecting this association and its affiliated organizations, helpfully or harmfully, affect the merchant, the producer and dealers in machinery and equipment, chemicals, pulpwood, pulp waste materials, etc. The larger paper industry must appreciate those common interests and get together for common good.

A first step in this coming together of all of these connected in any way with the paper industry in the United States may be the development of a new form of membership in the American Paper and Pulp Association, which may well be known as an "allied" membership. Such a membership could be open to representative men in all of the larger groups of the industry. That the activities and the strength of this association shall not be dissipated, such a membership would of necessity have to be guarded carefully. In an increasing way manufacturers and converters of paper are taking associate membership in closely related organizations, such as the Waste Material Dealers' Association, Paper Box Manufacturers' Associations, etc. A similar reciprocal affiliation with American Paper and Pulp could be made helpful to all concerned.

It may be said that the trade press serving the industry is an organized activity within the industry. The trade papers have served the industry splendidly, not only through their publications, but in assisting in the organization of unorganized groups, and they are continuing to assist the regular organizations in the industry in a very helpful way. During the past five years it has been my observation that the paper industry is better served by its trade press than some of the other great industries of the country. We desire the publishers of trade papers representing the industry to know that we wish to encourage and extend closer contact with them, and we trust that they will seek closer contact with the association, having constantly in mind the benefit or the damage that any expression of our policy and activity may have upon our interests in this country and our relations with the outside world.

Service by the Association

As each year closes it is doubtless the ambition of every association in the industry to be able to point to one or more outstanding accomplishments. This is not always possible any more than it is possible for every individual paper manufacturer to indicate as the end of each year that he has made certain definite accomplishments or advancements in his business. As the paper manufacturer often indicates at meetings that he is "running full" so the association might report at such meetings as this that it is "running full"—yet not up to capacity in service to be rendered.

The officers of your association appreciate very keenly the increasing amount of very necessary routine work which must be done from week to week and from month to month. It is sometimes a little difficult to explain to the membership just the character and importance of this routine work. Ask the average paper manufacturer what he is doing in the mill from week to week and from month to month and it is safe so say that he will report that he is producing paper. Your association, as the weeks and months pass, is giving increasing service and as executives come and go as officers of the association, they all appreciate the necessary character of routine activities.

But the past year has been an opportunity for more than routine work on the part of the association. The president of the association, in his address, has indicated to you what he considers to be some of the outstanding accomplishments of the association. It would not be out of place to emphasize that the fine service of the Membership Committee in making the association more fully representative of the industry is a real accomplishment.

The program of work for the coming year, which is being presented today, will indicate what your officers believe to be opportunities for better service to the membership for the coming year. The industry needs a strong statistician, working through the association and reporting regularly to the mills, not only rou-

tine statistics, but reports which would explain these statistics, thereby simplifying the keeping of the mills in contact with general business conditions as compared with conditions within the industry, the raw material situation, foreign trade, etc. The individual mills making up the association are spending in subscriptions to various economic service several times the amount needed for a trained statistician in the association. It is not generally appreciated that whenever these services make special reports on our industry that those reports must be based upon statistics put out by your associations, or upon reports from sources which are just as available to the association as to these various economic bureaus. It would make for economy and the saving of time of the individual mill executive could a statistician be employed who would send out weekly or monthly reports of equal value, as far as general business conditions are concerned, as reports from the economic services, are of very much greater value as far as the paper industry is concerned, because of the effective comparisons which could be made of conditions in the industry with general conditions, etc.

Active committees have been at work along line of taxation, distribution, standardization and membership. Some of these committees will make reports at this annual meeting.

Helpful contact has been maintained through the year with Washington and with the legislature of some of the paper-making states. No general national organization such as the Chamber of Commerce of the United States can guard the interests of our industry as we can do it for ourselves. We are making a strenuous and a continuous effort to watch the interests of the members wherever they may be.

The New Program of Work

Reference has already been made to the suggested program of activities for the coming year, which has been outlined by the president and parts of which will be presented by members of the executive committee of the association, and other leading executives. It would be in place to emphasize the feeling of the officers and staff of the association that the accomplishments of the year, in making the association really representative of the industry, brings to the association both greater opportunities and greater obligations. We are not at all satisfied with accomplishments such as they have been in the past. We feel strongly that only as the association meets the needs of its members in service that means a dollars and cents return on the investment which the industry has in it, will it be a going institution vital to the welfare of the industry.

The change in the form of mill membership in the association has accomplished not only the solution of the financial problems of the association, but has brought about direct responsibility on the part of the mill members for the support of the activities of the association. This direct responsibility of the mills for the work of the association, and the efforts of the association to give service that will be tangible evidence of returns on your investment in us, has made is increasingly clear that service by an association is a two-sided activity. The executives of member mills must recognize that the association is not an outside activity but a helpful part of the industry. Only as the mills give freely of information, statistics, technical and cost data, will it be possible for the association to meet the mills half way in the work to be done directly for the mills and for the industry as a whole. In other words, the mills must come to the association and use it before the association can really accomplish the results desired. It is, of course, a constant problem with every organization of men to bring about really effective use of the organization by its membership.

The Basis of Good Business Ahead

Good business ahead in our industry must depend not only upon the business ability of the individual manufacturer but upon a clear understanding by the manufacturers, individually and by groups, of the economic factors influencing the course of business and upon a willingness of manufacturers to work together as groups for the good of the whole. This suggestion that we must work together for the good of the whole is no longer considered a high sounding phrase or an ideal to be achieved by future generations. The program of meetings of this week indicates your strong belief in organized activities, in the getting together for a better understanding of common conditions and common needs and a working together for the good of the group.

As character after all enters largely into credit, so confidence and understanding, as between individuals in the groups making up our industry, enter into this promise of stable satisfactory business for the months ahead.

As there are sound reasons for expecting good business ahead for the individual manufacturer and for the industry as a whole, so there is good reason to expect good sound business ahead of the association in its service to the industry. Your cooperation has made the association possible. We are in need of your continued cooperation in the service which we must give if we are to take a real part in the economic development of the industry.

The staff of the association feels itself peculiarly fortunate to have been able to serve during the past year under the guidance of President Wilson. The individual member who has not been close to association work can hardly appreciate the time and thought demanded of the president of the association and the members of the executive committee. The willingness of busy executives to serve on the executive committee of the association means much, not only to the association, but to the industry as a whole.

What the association is able to accomplish for the industry in the years ahead will depend entirely upon what the members wish it to accomplish. Your officers and the staff of the association can but assist in making the organization what you want it to be. What any of your associations mean to the groups which they serve, or to the industry as a whole, must depend almost entirely upon your willingness to meet not only the secretary but the president and the executive committee just a little more than half way in what they are trying to do for you.

A Jubilee Year in 1927

Next year the association enters its 50th year of continuous existence. As the vicissitudes of life affect the individual human being for better or worse, so the vicissitudes of business have affected the association both for better and for worse, yet the association has come down to the present time better able than ever before to meet the needs of the industry and give service of value to each individual member. We believe that the industry should make its 50th year the occasion of a celebration that will put before the entire public of this great country the service which the industry is giving to the business and the progress of the country. We are a fundamental national industry. Our product is necessary not only to the business man, but to every man, woman and child. We should be proud of this and the celebration of our 50th anniversary should be a real opportunity for indicating our pride in the fundamental character of the work which we are doing.

WOODLANDS SECTION

The Woodlands Section put in a busy day Wednesday with all day sessions and an informal dinner at 6:30 p. m. Those who attended were rewarded by hearing an unusual number of worthwhile addresses covering the entire scope of the Section's activities.

A paper of outstanding interest was that on "Organizing for Forest Management in The Southern Appalachians" by W. J. Damtoft, forester, The Champion Fibre Company, Canton, N. C.

After explaining that the greatest problem in this section was in securing a sufficient regeneration of desirable species among trees, he went on to tell how the problem was being met. He said in part:

This fact that we are just beginning to gain knowledge is what gives to the subject "Organizing for Forest Management" such prominence at this time. In anticipation of the securing of the best solutions of our problems it is imperative that we begin now to prepare to be in position to apply such solutions and at the same time to take advantage of what little we already know; and it is of course also advisable for all of us to aid to as large an extent as possible in reaching solutions by carrying on individual experimental work in cooperation or conjunction with established research agencies such as the Government experiment stations.

The three major propositions therefore with which a forester for a wood using industry in the Southern Appalachians is at present concerned are:

A.—Preparing to keep timberlands in best possible condition for application of best cutting systems as rapidly as they are determined. This involves adequate protection from fire and other enemies, fullest utilization of existing stands, careful treatment of the forest in cutting operations, and accurate compilation of all data as it becomes available.

B.—Applying existing forestry knowledge toward putting into best productive condition all barren lands, and toward bettering the condition of cutover lands already in forest growth.

C.—Carrying on of a reasonable amount of experimental work to augment that being done by public and other agencies.

The first consideration in keeping forest land in best possible condition is, of course, protection from fires and other forest enemies. It is not difficult for owners of large areas of Appalachian timberlands to perfect organizations for discovering and fighting fires because the nature of the topography allows of commanding views, and the scattering of farmlands among the timber provides tenants or farm owners for a fighting organization. The real pressing problems are educating the public away from carelessness and indifference toward forest fires, and the establishment of cooperation among neighboring land owners. These problems can probably best be solved through the agencies of State organizations to which all possible support should be given. In North Carolina a very effective start has already been made by the State Forester although working with very meagre funds.

In any endeavor to secure the fullest utilization of existing stands close supervision must be maintained from the forest through all stages of preparing and transporting the products to the mill. In the woods there is the problem peculiar to any forest industry of getting labor to cut low stumps and to utilize as far into the tops of trees as possible. In transporting and storing the manufactured product there is the problem of preventing decay, and this is especially intricate in the case of a pulp and paper mill which utilizes almost every variety of tree species native to the Appalachians, for the reasons that there is such a great variation among the species in resistance to decay, and their rate of consumption by the mill varies with the great uncertainties of the markets in its demands for the different grades of pulps and papers into the making of which the different species enter.

"The South Is in Earnest About Reforestation" was the subject of another interesting paper by William L. Hall.

Mr. Hall went into the extent of the reforestation movement in the South and said the lumbermen were beginning to realize the growth possibilities of their land. He then told of reforestation plans that are now being carried out and said in conclusion:

"With intensive forestry being practiced by many of the leading lumber companies there will before long develop the problem of thinning the second growth stands. This and other considerations will lead some of the companies to consider the installation of pulp mills. Several kraft mills now run in conjunction with lumber operations. It is believed that such mills can profitably utilize thinnings from second growth stands, consisting of trees 5 to 10 inches in diameter, and that they can also use top logs and large limbs resulting from logging operations which material is now generally left in the woods. If this can be done it will help greatly in leaving the woods in safe condition following logging and thereby substantially promote reforestation."

"Methods of Forest Management for Pulpwood Production" was the subject discussed by George T. Carlisle, Jr., consulting forester of Prentiss & Carlisle Company, Inc., Bangor, Maine. He gave a fine summary of conditions in the forest area of Maine. One specific operation which was of great interest he told of as follows:

"I have in mind one tract of some 10,000 acres purchased in 1870 for about 54 cents an acre. Since that time it has been held in one family and has always been cut to a 14 inch diameter limit. To date it has returned a value of fifteen dollars per acre over and above interest and taxes and is one of the most valuable holding in the family. It has a fine reproduction of young growth of uneven age and sawlog cuttings are still going on.

The chief objection to this method of cutting I think is the danger of loss from blowdown and also that there may be defective trees below the diameter limit.

"For sawlogs this method has worked well and has kept our lands producing in short rotation, but for pulpwood a new factor arises. We realize that the greater the cordage the less the cost of the operation will be. I am afraid it would be hard to prove in dollars and cents that the diameter limit pays but rather that we should cut clean and on longer rotations. On land so cut I can see little difference in the reproduction and in the future we will have even aged stands over progressive areas."

Other addresses listened to were, "The Forester Comes Back," by Austin Cary, lumberman, U. S. Forest Service; "Logging for a Second Cut," George Banzhaf, Forest Engineer of Banzhaf & Watson, Inc., Milwaukee, Wis. and "Pulpwood Situation of the Lake States," by D. A. Crocker, forester.

At the opening of the session Wednesday morning, the chairman, George N. Ostrander greeted the members and Secretary-Treasurer O. M. Porter submitted his report which was accepted.

The officers elected at the afternoon session were:

Chairman—George N. Ostrander, Finch, Pruyn & Co., Glens Falls, N. Y.

Vice-Chairman—H. B. Collins, Dill and Collins, Philadelphia, Pa.

Secretary-Forester—D. A. Crocker, New York.

Executive Committee—George N. Ostrander, H. B. Collins, D. A. Crocker, Howard Beedy, Oxford Paper Company, New York; O. L. E. Weber, Watab Paper Company, Sartell, Minn.; W. C. Damtoft, Champion Fibre Company, Canton, N. C., Julian Rothery, International Paper Company, N. Y.

WORK OF THE IMPORT COMMITTEE

The following statement was made by counsel for the Import Committee at annual meeting of American Paper and Pulp Association on Thursday:

That on February 1 there were docketed for trial before the Board of General Appraisers, the Customs trial court, 681 cases involving misclassification of paper, and 200 cases involving undervaluation, was the statement made by Cola G. Parker, of Wise, Whitney & Parker, counsel for the Import Committee of the American Paper Industry, in reviewing the work of the committeee before the American Paper and Pulp Association at its annual meeting. In making this summary of the situation, Mr. Parker outlined the steps resulting in the formation of the Import Committee, the method of its operation, and the character of the cases which have come to its attention. For instance, he pointed out that in the period from October, 1924, when the committee was formed, to June, 1925, the committee handled 113 kinds of customs problems, some of them involving as many as forty importations.

The effect on importations was pointed out by the reduction in importations of those grades of paper in which there have been found many cases of evasion of the tariff laws, and added it as his opinion that the extent of undervaluation now being

practiced is far greater than has as yet been uncovered. The formation of the Import Committee was described as being insurance against unfair foreign competition.

In conclusion he said:

"The United States is the greatest paper market in the world, and the activity of a part of this market is always the goal of every other nation in the world. Most foreign nations are equipped with an efficient merchant marine. They are able to distribute their manufactured products in the markets of the world at a tremendous advantage in the way of freight rates, and in the accommodation they can give their customers, as compared with such a nation as the United States. If, with a handicap of this kind, the United States allows the product of European and other nations to enter our markets misclassified, undervalued, or dumped, we shall have only ourselves to blame. We cannot afford to live in a fool's paradise, with the idea that these markets of ours are immune to foreign competitors. The Import Committee has undoubtedly eliminated to a large extent unfair competition in our home markets, but to continue to do so it must have your united support, both morally as well as financially, that it may permanently stand as a watchdog at our gates. All that we seek in your behalf is a fair and square enforcement of the law, to the end that the industry will be relieved of the unfair foreign competition which it has faced so long."

PAPER SALESMEN'S ASSOCIATION

At the annual meeting of the Salesmen's Association of the Paper Industry, on Tuesday, the most important feature of the proceedings was the immediate inauguration of a national and educational program.

J. H. Tregoe, secretary of the National Association of Credit Men, pleaded for co-operation between salesmen and credit men, saying in part:

"In a time of such great national prosperity, with our billions of dollars in gold reserves, there is great danger of an over expansion of credit, and every business panic ever known has come from such too liberal credit. The salesmen and the credit men must work together. To do so, it is necessary that the credit man has a sales point of view, and the salesman the credit man's point of view. We need the four C's viz., Credit, Character, Capacity and Capital."

A continuation of the annual intersectional golf tournament was decided upon, with Carlton Smith, of West Carrollton, as chairman of the Golf Committee. A rising vote of thanks was tendered to Edwin D. Peck for his services as acting-secretary for the interim between the retirement of the previous secretary and the annual meeting, at which a permanent secretary could be chosen. D. A. Crocker, of the American Pulp and Paper Association, was elected secretary.

The following officers were elected:

PRESIDENT—Walter E. Perry, Chemical Paper Manufacturing Company, Holyoke, Mass.

VICE-PRESIDENTS—

New England Division—George C. Cadwell, American Writing Paper Company, Springfield, Mass.

New York Division—Charles Nickenig, Canadian Export Company, New York, N. Y.

Chicago Division—J. H. Coy, Flambeau Paper Company, Chicago.

Miami Valley Section—Colin Gardner, Gardner & Harvey Company, Middletown, Ohio.

COST ASSOCIATION MEETINGS

The fifteenth annual meeting of the Cost Association of the Paper Industry was held at the Waldorf-Astoria Hotel, New York, on Tuesday and Wednesday. On Tuesday, a joint meeting with the Technical Association of the Pulp and Paper Industry was held, to hear the report of the Waste Committee of the latter association on the following subjects: "Paper Mill Waste and Stream Pollution," and "White Water Treatment," by Noel Cunningham.

Following this meeting another session was held, at which A. J. Haug gave an interesting and instructive address, "A New Step in Pulp Screening," which was followed by a discussion.

On Wednesday morning, C. R. Stevenson, of Stevenson, Harrison & Jordan, New York, gave an informative talk on "Predetermined or Standard Costs, as Applied to Paper Mills," bringing out his point in an exceedingly lucid manner. Another important address was rendered by J. C. Oswald, of the United Typothetæ of America, who spoke on "The Value of the Cost Bureau."

In the afternoon, a luncheon meeting was held, an account of which appears on another page of this issue. At a later session, Virgil P. Ettinger, of Horne & Ettinger, formerly editor of *Prentice Hall Tax Service*, and lecturer at New York University on Federal Income Taxes, gave a valuable address on "Changes Made by the New Revenue Act, and Federal Tax Over-Payments."

The session closed with a speech by P. K. Knight, of Arthur Andersen & Co., New York, the subject of which was "The Scope of Financial and Industrial Investigations."

WAXED PAPER ASSOCIATION

Enthusiasm over the progress made in waxed paper activities during the past year featured the meeting of the American Waxed Paper Association held Tuesday morning. Matters of trade interest were fully discussed and an optimistic view taken of the entire waxed paper situation. The attendance was gratifyingly large. Officers elected were as follows:—

President, Arthur Havemeyer, Package Paper Company.

Eastern Vice President, Arthur W. Moore, Shawmut Waxed Paper Company.

Western Vice President, R. B. Donnelly, Central Waxed Paper Company.

Executive Committee, C. R. Wright, Waterproof Paper and Board Company; W. L. Carter, Nashua Gummed and Coated Paper Company; George N. Gardner, Menasha Printing and Carton Company; J. Kindleberger, Kalamazoo Vegetable Parchment Company; W. J. Eisner, Newark Paraffine and Parchment Paper Company.

WRITING PAPER MANUFACTURERS

The Writing Paper Manufacturers' Association elected the following officers at a well attended meeting Wednesday morning.

President—W. M. Crane, Jr., Crane & Co., Dalton, Mass.

Vice-Presidents—D. K. Brown, Neenah Paper Company, Neenah, Wis., and A. H. Nevius, Miami Paper Company, Dayton, Ohio.

Executive Committee—W. M. Crane, Jr., chairman; D. K. Brown, A. H. Nevius, A. C. Gilbert, Gilbert Paper Company, Menasha, Wis.; B. A. Franklin, Strathmore Paper Company, Mittineague, Mass.; A. C. Smith, Keith Paper Company, Turners Falls, Mass.; S. L. Willson, American Writing Paper Company, Holyoke, Mass.

In the afternoon the Fine Paper, Middle Grade and Sulphite Bond Divisions held their separate meetings, good attendance being reported in each instance and valuable discussions of trade matters being participated in.

GLAZED PAPER ASSOCIATION

At the meeting of the Glazed and Fancy Paper Manufacturers held Wednesday afternoon, officers were elected for the ensuing year, as follows:

President E. C. Smith, of the Nashua Gummed and Coated Paper Company, Nashua, N. H.

Vice-President, A. S. Guggenheimer, of the United Manufacturing Company, New York.

Treasurer, R. N. Fowler, of the Hampden Glazed Paper and Card Company, of Springfield, Mass.

Secretary, O. M. Porter, 18 East 41st street, New York.

Executive Committee, Jesse Linton, of the Pawtucket Glazed Paper Company, of Pawtucket, R. I.; W. B. Snow, of the Middlesex Products Company, of Boston, Mass.; I. O. Van Duzer, of Louis De Jong & Co., New York City; C. W. Walther, of Walther & Co., New York City, and J. B. Van Horn.

The meeting was held at the Canadian Club, Hotel Belmont, and was preceded by an informal luncheon.

TISSUE MANUFACTURERS' ASSOCIATION

The meeting of the Tissue Paper Manufacturers' Association held on Tuesday morning was marked by an unusually large attendance. The discussion of various trade matters brought out a wide expression of individual opinions and the session proved one of the most interesting the Association has ever held. The following officers were elected:—

President, Z. W. Ranck, of the Crystal Paper Company, Muddletown, Ohio.

Vice Presidents, J. M. Conway, of the John Hoberg Paper Company, Green Bay, Wis.; J. E. Rieg, Erving Paper Mills, Erving, Mass.

Secretary-Treasurer, E. H. Naylor, Springfield, Mass.

Executive Committee, Z. W. Ranck, chairman; J. B. Rieg, P. M. Allen, Detroit Sulphite Pulp & Paper Co., Detroit, Mich.; E. H. Benson, Regal Paper Company, Pulaski, N. Y.

Member of Advisory Council of American Paper and Pulp Association, Z. W. Ranck.

COVER PAPER MANUFACTURERS

The Cover Paper Manufacturers' Association held its annual meeting Tuesday afternoon, when the following officers were elected for the ensuing year:

President, Minor M. Beckett, the Beckett Paper Company, Hamilton, Ohio.

Vice-President, Col. B. A. Franklin, Strathmore Paper Company, Mittineague, Mass.

Secretary-Treasurer, E. H. Naylor, Springfield, Mass.

Executive Committee, Minor M. Beckett, the Beckett Paper Company, Hamilton, Ohio; Col. B. A. Franklin, Strathmore Paper Company, Mittineague, Mass.; William H. Howes, Knowlton Brothers, Watertown, N. Y.

U. S. PULP PRODUCERS ASSOCIATION

At the annual meeting of the United States Pulp Producers on Tuesday afternoon the following officers were unanimously re-elected to serve for another term:

President, Herman Elsas, Continental Bag and Paper Mills, New York.

Eastern Vice-President, J. P. Hummel, Hummel-Ross Fibre Corporation, Hopewell, Va.

Western Vice-President, D. C. Everest, Marathon Paper Mills Company, Rothschild, Wis.

Secretary-Treasurer, O. M. Porter, 18 East 41st street, New York.

SUPPLY AND EQUIPMENT ASSOCIATION

During paper week, the Supply and Equipment Association conducted a number of informal gatherings at which the aims and purposes of the association were explained. On Friday afternoon a director's luncheon was held which proved most enjoyable and at which optimistic views were expressed on the future of the organization, which has become a definite and important part of the paper industry.

SOUTHERN KRAFT ASSOCIATION

Informal gatherings were held by the Southern Kraft Manufacturers' Association on Monday and Tuesday afternoon. There was a satisfactory attendance at the meetings, and numerous matters of interest to the makers of Southern kraft were freely discussed.

PROVINCIAL CO. HAD GOOD YEAR

The Provincial Paper Mills, Limited, held its annual meeting last week in Toronto, Ont., and a prosperous year was reported, showing manufacturing profits of $1,045,493 for 1925 as compared with $878,012 in 1924. With a small income from other sources, the company was able to provide for bond interest, $300,000 for depreciation and $70,000 for taxes, in addition to $364,000 for dividends, leaving a balance of $222,299 to be added to the surplus which now totals $936,240. The working capital shows substantial improvement, net working capital, at the close of the year, being $1,580,108 against $1,471,320 last year. Current assets are reported at $2,115,867 against $2,108,286, and current liabilities at $535,759 against $636,966 at the close of 1924.

In December last, the company purchased the shares of the John Martin Paper Company, with warehouses in Winnipeg and Calgary and a sales office in Edmonton. It is the intention of the company to continue the sale in the western provinces of various grades of paper in addition to those made by the mills of the Provincial organization. For this purpose, a new company was formed known as Provincial Paper Sales, Limited. As a result of the foregoing development, the payment of the balance due on the head office of the company and the purchase of $20,000 of the company's bonds for sinking fund, there was considerable increase in the investment account which now stands at $346,739. It is understood that the company will add another machine during the present year to the Port Arthur mill, which will double the capacity. The output of the pulp plant will also be augmented to take care of the increased paper production, which will partake of the half tone news and specialty lines.

GRAPHIC ARTS NIGHT POSTPONED

For the second time it has been decided to change the dates for the coming Graphic Arts Night celebration, the annual get-together social function of Philadelphia Paper Trade Association, the Typothetae and its allied industries. It had previously been decided to hold the annual event on February 18. This date was changed to March 11 and now it has definitely been set for March 9. The change in date was necessitated because of the plans of the Philadelphia Wholesale Waste Merchants Association to hold its annual banquet and meeting on March 11. The same place selected in the earlier announcements has been set aside for the March 9 celebration and so the Graphic Arts associates will convene at the Penn Athletic Club, in Rittenhouse Square, as originally intended. It has also been decided to hold a joint social function with the paper men, Typothetae associates, and the membership of the Philadelphia Club of Printing House Craftsmen, this being the first time that the latter organization has been actively connected with the social gathering.

TWO NEW MACHINES FOR ST. LAWRENCE

The St. Lawrence Paper Mills have decided upon a programme of expansion that will call for the addition of two news print machines, and increase the capacity of the Three Rivers plant from 150 to 300 tons daily. The order for the new machines has been given to the Dominion Engineering Company and it is expected both will be in place by the end of the current year. Work has already begun on the building to house these new machines. St. Lawrence Paper Mills is arranging also to double the capacity of the groundwood pulp mill, that is from 125 to about 250 tons daily. The company has a sulphite pulp mill of about 120 tons capacity which is more than sufficient to cover the increased news print production.

PAPER MAKERS' ADVERTISING CLUB

An enjoyable luncheon was held on Wednesday afternoon by the Paper Makers' Advertising Club, at which matters of interest to the membership were discussed and ideas freely exchanged.

TECHNICAL ASSOCIATION MEETS

Eleventh Annual Meeting of the Technical Association of the Pulp and Paper Industry is Held at the Waldorf-Astoria, New York

George K. Spence, of the New York and Pennsylvania Co., Is Reelected President of the Association—Has Been an Exceptionally Large Increase in Membership and Especially Corporate Membership During the Past Year—Continually Increasing Interest Is Shown in the Service to Members Plan—Committees Do Good Work But More Support on the Part of Members Generally Is Requested.

The eleventh annual convention of the Technical Association of the Pulp and Paper Industry was held February 23 to 25 inclusive and was an unusual success in every respect. Members were in attendance from every section of the country as well as from Canada. G. K. Spence, the president of the association delivered his annual address as follows:

PRESIDENT'S ADDRESS

In order to save time and avoid duplication of data, the Executive Committee has deemed it advisable for the President's address to include the report of that Committee. My review of the activities of the Technical Association during the past year will, therefore, also cover the recommendations of the Executive Committee.

There are several outstanding features which are evidence of the increased interest taken in the work of our Association, the most noted being the extremely favorable increase in membership, and more especially in corporate membership. The Technical Association is dependent upon the dues of corporate and other classes of members for funds with which to carry on its work, and your Executive Committee, realizing that there had been no increase in the number of corporate members for several years, launched a drive which resulted in the addition of twelve new corporate members this past year, bringing the total to forty-two.

Increase in Members

There has also been an exceptionally large increase in other grades of membership during the past year, as will be shown by the secretary's report.

Service to Members

The Service to Members Plan which was well under way in 1924, has been continually increasing in interest, and the number of responses to inquiries sent out has been very gratifying. Transcripts of replies to thirty-seven inquiries under this plan have been completed, and distributed to corporate members, and to those participating. These transcripts are of inestimable value to mill operators receiving them, as they furnish real authentic information derived from the comparison of the experience of others on problems common to all. This plan has been one of the Association's strongest talking points when soliciting corporate members, and from the number of commendable remarks made by corporate members relative to benefits derived from information contained in these transcripts, we are assured that when a company enrolls as a corporate member, it will continue its membership. If other companies were familiar with the advantages to be derived from such membership, in addition to signifying their approval of the work accomplished by the Association, all would be enrolled as corporate members.

GEORGE K. SPENCE, PRESIDENT

Local Sections

The formation of Local Sections of TAPPI has come up for discussion several times, but no definite plan of procedure has been adopted. In order to accomplish some results along this line, a Local Sections Committee should be appointed with our secretary as its chairman. The duty of this committee will be to determine localities in which sections might be formed, and make proper arrangements for such installations.

The secretary, as chairman of the committee, should visit the mills in the localities selected, call group meetings, and lay the organization plans before them. The increase in membership, due to this contact, should increase the Association's finances enough to more than pay the expenses of the secretary when handling this work, and in addition give him an opportunity to visit more mills, which will be of considerable advantage to the Association.

Training in the Industry

The personnel of Mr. Griffin's Committee on Training in the Industry is such that we can expect some very constructive work along this line in the near future.

The activities of this committee will tend to bring pro-

gressive paper manufacturers into closer cooperation with the manufacturers of paper mill machinery and technical schools, and be of great benefit to all concerned.

There should be closer contact between the Technical Association and technical schools, as the benefits derived from such contact will be reciprocal. The technical schools can be assisted by the Technical Association in placing men in desirable positions in the industry, and the Association can look to these schools for a large quota of junior members upon graduation each year.

Abstracts and Bibliography

The Committee on Abstracts and Bibliography is continuing its excellent work. Very little, if anything of value in the pulp and paper making field has been overlooked by this Committee. Its work during the past few years has been of inestimable value to the industry, as the references which it has compiled have been most complete. The Executive Committee is very grateful to the Chairman and members of this Committee for the steady, consistent and valuable work which they have been doing.

Paper Drying

The Committee on Paper Drying has been very active, and due to its studies and recommendations, more economical drying results have been accomplished. In addition, the moisture content has been kept more constant, and the quality of the finished sheet improved, due to proper temperature control while drying.

Heat, Light and Power

The studies and recommendations of the Heat, Light and Power Committee have been, and will continue to be, of inestimable value to the industry, more especially its work on the analysis of the power requirements of the various machines used.

Heat, light and power are important factors in the cost sheet, and anything which this Committee can recommend to accomplish the more economical distribution of these three items, will be reflected in the cost sheet.

Mechanical Pulp

Among other activities of the Committee on Mechanical Pulp, it has devoted considerable time to the study of means for utilizing screenings, and also to the application of the freeness test for controlling the quality of the pulp. The deductions will be of great value to those interested in the production of groundwood pulp.

Chemical Pulp

There is a broad field to be covered by the three committees handling problems relative to the manufacture of chemical pulp, and a number of these problems are receiving the attention of the different committees. While such problems as washing brown stock, evaporating spent liquor, causticizing soda and reclaiming lime are common to both the soda and sulphate processes, there are some problems which are distinctive of the individual process.

If the experiment now being conducted by the Soda Pulp Committee, which involves the use of a smelter similar to the one used in sulphate is successful, it will bring these two processes still closer together, as it will do away with the leachers at present used in the soda process and make the problem of smelter linings common to both.

The evaporator code which the Soda Pulp Committee has worked out is equally applicable to the sulphate process and will be of considerable assistance to the manufacturer of both soda and sulphate pulp.

The Technical Association now has an active Sulphate Committee, and we can look for some constructive work by the Committee in the future. I consider one of the most important problems for this Committee to solve is that of determining a method for the elimination of the disagreeable odor that is now prevalent about a sulphate mill. When this is solved, it will be another step toward bringing the two processes on a common basis, as all soda pulp mills will use some sodium sulphide in the cooking liquor. It has been a pretty well established fact, due to the investigations made by the Soda Pulp Committee and others, that the yield, quality and bleachability of the pulp is improved by the use of sodium sulphide in the cooking liquor. The principal objection to its use at the present time is the odor, which is offensive to a number of people.

The Sulphite Pulp Committee has been doing good work on standardization of methods for comparing pulps for various purposes.

There have been so very many modifications of the sulphite process suggested during the past few years, that it would be very interesting to the sulphite manufacturers, if the Committee would accumulate all data relative to the different proposed modifications together with information pertaining to the advantages to be derived from them.

The work of the different chemical pulp committees is very much appreciated by the members.

Paper Testing and Standard Methods

The Paper Testing Committee and the Committee on Standard Methods of Testing Materials have been very active during the past year. B. W. Scribner, Chairman of the Paper Testing Committee, called a meeting of his Committee in Washington, and M. A. Krimmel, Chairman of the Standard Methods Committee, called a meeting of his Committee in New York during the past year, and both were well attended. Such interest on the part of the committee members is evidence of the excellent work they are doing.

Those attending the Sectional Meetings of the committees this week will be well satisfied with the progress which they have been making. The work of these committees on standardizing methods for testing is of the greatest possible value to the members of our Association.

Cellulose, Coated and Processed Papers, Dyestuffs

The Committees on Cellulose, Coated and Processed Papers, and Dyestuffs have been active during the past year, continuing their good work, which will be evidenced by the constructive program which they have to offer for discussion at their Sectional Meetings.

Waste

It was not my thought, when leaving the discussion of the work of this Committee to the last, that its work was any less important than that of the other Committees. On the contrary, the results obtained by this Committee mean more in dollars and cents to the pulp and paper manufacturers than the findings of any other standing committee of the Association.

The work of the Waste Committee is far reaching, as it covers all branches of the pulp and paper industry, from the time the stick of wood reaches the yard, until the finished sheet of paper leaves the mill.

In many cases Waste in the Industry and Stream Pollution go hand in hand, but not always so, as there are some wastes which do not cause stream pollution, and on the other hand some stream polluting materials, which from an economic standpoint, cannot be considered waste. They are so closely allied that there should be a sub-committee of the Committee on Waste in the Industry, so as to handle problems relative to stream pollution. The duty of this sub-committee would be to study materials entering the streams in the pulp and paper mill effluent, which cannot be economically removed, to determine whether or not they have any detrimental effect on the stream, and the amount of such effluent a stream of a given flow can inoffensively assimilate. It can be proven that some of the materials are not detrimental to the stream, and in cases where they might be found harmful to certain streams, this sub-committee can determine the most satisfactory means for their removal.

The Committee on Waste in the Industry has been doing excellent work in compiling data relative to what has been done by

different mills to eliminate waste in the different departments, and in offering constructive suggestions as to what can be accomplished along this line. The work of this Committee has been very much appreciated by the Executive Committee and the entire membership.

Knowing that more constructive work can be accomplished by cooperation rather than antagonism, the Health Department of the State of Pennsylvania and technical representatives of a number of the leading pulp and paper manufacturing companies in Pennsylvania, all of whom are members of the Technical Association, have organized a committee for the purpose of studying the best means of removing certain materials from pulp and paper mill effluent, in order to improve the degree of purity of the waters of the state.

This committee recently adopted resolutions inviting the cooperation of similar committees in other states having like problems, as well as all pulp, paper and board manufacturers in Pennsylvania, accepting the offer of cooperation of the Waste Committee of the Technical Association, and requesting the approval of the Technical Association of its plan, as set forth.

Since these resolutions were adopted and approved by the Sanitary Water Board of Pennsylvania, the Sanitary Water Boards of Ohio, Connecticut, Virginia, West Virginia, New York and Wisconsin have approved the steps taken and expressed their willingness to cooperate, some of them being very enthusiastic in their praise of the manner in which the Pennsylvania Committee is approaching the subject.

G. D. Bearce, Chairman of the Committee on Waste in the Industry, who was present at the last meeting of our Pennsylvania Committee, will bring the resolutions before the Association, and it is my earnest desire that the method of procedure as outlined by the Pennsylvania Committee will meet with the approval of this Association.

Fall Meeting

A very well attended and interesting Fall Meeting was held in Kalamazoo, Mich., October 14 and 15. Due to the excellent arrangements made by Fred Clark and his local Committee, all who attended were unanimous in their approval of the success of this meeting. There was but one criticism offered, and that was that the meeting was not long enough. I agree with many of those who suggested that the Fall Meeting should be of three days' duration, in place of two, having business sessions every morning, and visitations in the afternoon. Some years ago the Fall Meetings were changed from three days to two days, on account of comparatively hard times, but more satisfactory results can be obtained when holding the Fall Meeting in a paper mill center if we revert to the old customs of holding three day sessions.

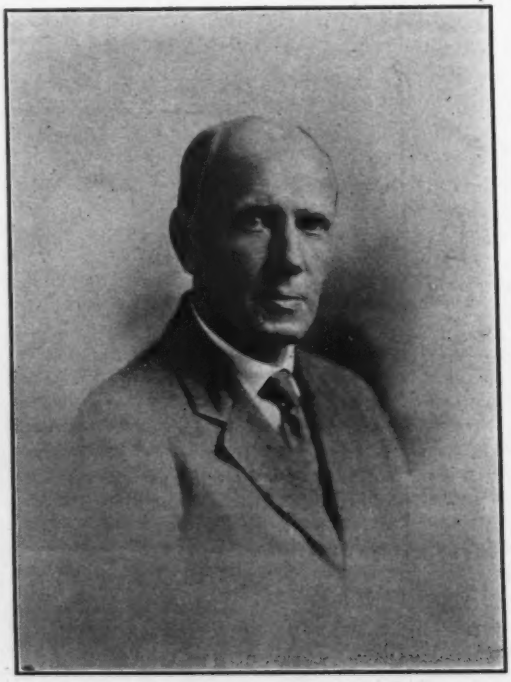
Thanks to Members

In conclusion, as President and on behalf of the Executive Committee, I wish to thank the members of the different standing committees, and the entire membership, for the assistance they have rendered in making this past year a very successful one for TAPPI.

REPORT OF SECRETARY

The following report was submitted by W. G. MacNaughton, secretary-treasurer:—

Since my 1925 report it can be truly said that the objects of the Association have been prosecuted diligently, and as a result the association itself has increased in influence.



WILLIAM G. MACNAUGHTON, SECRETARY

Value of Committee Work

It must be admitted that there is still much to be desired in the support given by the members to the Chairmen of the Standing Committees. It should be recognized that the work of these committees is the solution of the everyday problems common to the industry. Much has been done in the past eleven years since its organization that has been reflected directly in more efficient plant operation, and lowered cost of production. Not the least valuable has been the mental stimulus to the individual members through intelligent study of their problems in cooperation with fellow members similarly engaged.

Service to Members

The exchange of experience under the Service to Members Plan, now in its third year, has unquestionably been fully as beneficial to those who have contributed to the discussions as to those presenting the inquiries.

Special inquiries on all kinds of subjects to the number of twenty have been handled during 1925, and we have reached Special Inquiry No. 37.

Another important service has been the assistance extended both to companies desiring competent men to fill positions and to members wishing to improve themselves. While the Association does not conduct an employment bureau, it is becoming increasingly recognized that membership in TAPPI is a very fair index of a man's experience and standing in the industry. For the younger men it is an especially desirable service, which the Association is very glad to extend.

Training in the Industry

The industry as well as TAPPI is to be congratulated on the active interest shown in industrial training by the dean of the paper technical men, Martin L. Griffin, who gladly took the chairmanship of the Committee on Training in the Industry. His representative Committee should bridge the gap that has existed between the technical school and the industry for the young chemist and engineer by providing him an opportunity for practical training during vacations and and after graduation.

Very generally when a plant wants a technical man, it is specified that he must have had two or three years of experience. The Committee on Training, it is expected, will soon be in a position to help the industry to train chemists, engineers and technical men for its own needs.

Local Sections

I regret that there have been no new local sections formed. Perhaps this has been my own fault, but it seems to me that the proper plan has not yet ben developed. The potential value to the industry and to the members of active local sections, however small, is great and careful study should be given to the way they should be formed and their interest maintained in conformity with the ideals of the Technical Association.

Tappi International in Scope

If members have noted the wide distribution of its personnel, both individual and corporate, they must realize that TAPPI, in theory an international society, is rapidly becom-

ing one in fact. It is to be expected that the Corporate members in Newfoundland and the Netherlands, and the individual members scattered throughout Europe and Asia, represent the beginning of our broadening contacts.

Visits

During the year, besides the Annual Convention of the Canadian Technical Section in Montreal, and its summer trip to Ottawa, Hull, Lachute and Montreal, I attended the annual meeting of the Superintendents Association in Niagara Falls, New York, and the Cost Association in Buffalo.

Through the courtesy of the Newfoundland Power and Paper Company of which John Stadler, one of the original members, is managing director, I had the pleasure of attending the official opening of the mills at Corner Brook, Newfoundland.

It was a most delightful trip on the S. S. Nayarit from Montreal and along the north shore of the St. Lawrence, stopping enroute at Quebec, Murray Bay and Anticosti. After three days at Corner Brook where the mills, townsite and power plant were inspected, and the festivities enjoyed, we returned along the south shore, stopping at Gaspe and Quebec.

Shortly after my return, it was through the generosity of one of the members, A. J. T. Taylor, showing his appreciation of the potentialities of the association, that I spent several weeks in Europe with a party of engineers, visiting England, Sweden and Norway. In Sweden besides making a careful study of Ruth's Steam Accumulator in a wide range of industries under the guidance of Dr. Johannes Ruth, I was able to visit each of our members there and meet many other prominent mill engineers, including Frederick Grewin, President of the Association of Cellulose Engineers, and Chemists, and to see much of the country and many of the pulp and paper mills.

Special acknowledgment must be made to Otto Nordstrom for his courtesy and generosity in connection with my mill visits. In Norway I visited two mills as well as the Cellulose Research Laboratory of which Dr. Sigurd Samuelson is director. I also visited the Norwegian members and met a number of other paper mill engineers.

In England, besides seeing something of London, I visited Arthur Baker, a member, who is managing director of Bowaters Paper Mills, Northfleet, Kent, and is also very influential in the industry in England. I also saw the Empire and the Imperial Paper Mills, besides Bowaters, which were in course of erection.

Mention should be made of the rare old book on papermaking which Mr. Baker gave me, a copy of the first Edition 1800, of Dr. Matthias Koops's work on materials used to record events which is printed on "the first paper made from straw," with an appendix on the "first wood pulp paper."

While the two trips were particularly delightful experiences to me personally, I am sure that they have been of considerable value to the Association through what I was able to see, and the personal contacts I made during my travels.

While abroad, I was impressed with the evident recognition that TAPPI is the foremost organization of its kind in the stimulation it has given towards improvement of processes and plant operation in the paper industry, not only here in America, but elsewhere throughout the world.

Publications

The Technical Section of PAPER TRADE JOURNAL has been conducted as in former years, and the relations with the editor, H. J. Berger and the publishing staff have been extremely happy.

Through the courtesy of Chemical Foundation, Inc., two valuable pamphlets have been distributed to the members, "The Fifth Estate," by Dr. Arthur D. Little, one of the original members, and "What Price Progress?" by Hugh Farrell.

Research

The advanced step in the matter of industrial research taken by the industry in Canada is worthy of record. A substantial yearly appropriation has been made by the Canadian Pulp and Paper Association towards the support of the Forest Products Laboratories of Canada for the prosecution of special problems in pulp and paper manufacture. In addition, a department of Industrial and Cellulose Chemistry has been started in McGill University, Montreal, with which the Laboratories are associated through the legacy of Mrs. E. B. Eddy, widow of one of the pioneer paper manufacturers of Canada. The head of it, recently appointed, is Dr. Harold Hibbert, formerly professor of cellulose chemistry, Yale University, who is well known to many of the members.

I have already mentioned the Research Institute financed by the Norwegian Cellulose Association, which is located at Embretsfos in one of the mills of Union Company, of which Magnus Christiansen, one of our members, is managing director. It is directed by Dr. Sigurd Samuelson, a Darmstadt graduate. The first research problems being undertaken are a study of the sulphite process for the production of pulp for special uses, and also a study of the white water losses and means to prevent them.

In the University of Cincinnati, the Lithographic Technical Foundation financed liberally by lithographers and manufacturers of paper, ink, and other supplies, is located the research department of the Foundation. One of the first studies being undertaken is the paper used and the characterstics affecting its quality in lithographic use.

The national Association of Glue Manufacturers is continuing its research on glue for coated paper at the Paper Section Bureau of Standards.

The extremely valuable work done by the U. S. Forest Products Laboratory and the Bureau of Standards on their limited appropriations merits the hearty appreciation of the industry.

Membership

There were on February 1, 1926:

84	Junior Members
140	Associate Members
408	Active Members
42	Corporate Members
674	Making a total of

This number represents an increase of 79 individual members and 11 corporate since last February's report. During the year 48 members resigned or were dropped and 138 new members were elected or reinstated.

This is all very encouraging, but no more than should be done. If the Technical Association continues to follow the line of opportunity and duty, this rate of increase should be expected to continue.

TECHNICAL ASSOCIATION OFFICERS

The Technical Association held its election of officers on Wednesday afternoon. The nominating committee in making its report suggested the election of two additional members of the Executive Committee, and stated that it had deemed it wise to suggest the name of a representative from the South and one from Canada. The report was accepted and the secretary was instructed to cast one ballot for the following officers:

President, George K. Spence, of the New York and Pennsylvania Company (re-elected).

Vice-President, E. C. Tucker, of the Chemical Paper Manufacturing Company, of Holyoke, Mass. (re-elected).

Secretary-treasurer, W. G. MacNaughton (re-elected).

The Southern member elected to the Executive Committee was R. H. Laftman, general manager of the Bogalusa Paper Company, Inc., and the Canadian member was H. O. Keay, of the Laurentide Company, Ltd., who is chairman of the Canadian Technical Association. B. T. McBain, of the Columbia River Paper Mills, Vancouver, Wash., whose term as a member of the Executive Committee expired, was also re-elected.

Mr. Spence thanked the members of the association for the confidence indicated by their re-election of him. He said that since he became a member of the association in 1917 he had not missed a meeting, and would try the coming year to work harder than ever in the interests of the association.

Those Who Attended the Convention

Among those who attended the various conventions were the following:

A

John Adie, Taylor-Logan Co., Papermakers.
E. F. Agnew, International Paper Co., New York City.
G. R. Alden, Dennison Mfg. Co.
Jerome Alexander, Consulting Chemist, 50 East 41st St., New York City.
A. F. Allen, Tidewater Paper Mills, New York City.
A. L. Allen, General Electric Co.
P. M. Allen, Detroit Sulphite Pulp & Paper Co.
L. C. Anderson, W. B. Oglesby Paper Co.
C. K. Andrews, Itasca Paper Co.
A. E. Armstrong, Armstrong Machine Works.
W. D. Arnot, Newton Falls Paper Co.
W. H. Artz, Westinghouse Electric & Mfg. Co.
Henry Atwater, A. M. Collins Mfg. Co.

B

C. B. Bacon, Write, Inc., New York City.
H. R. Baldwin, Hammermill Paper Co.
R. R. Baker, Westinghouse Electric & Mfg. Co.
W. E. B. Baker, Continental Paper & Bag Mills Corp.
H. C. Barbour, International Pulpstone Co.
Norman Bardeen, Lee Paper Co.
L. F. Barsa, Union Bag & Paper Co.
F. L. Barstow, Falulah Paper Co.
G. D. Bearce, News Print Service Bureau.
F. K. Becker, Bird Machine Co.
M. M. Beckett, Beckett Paper Co.
C. Beebe, Neumeyer & Dimond, 82 Beaver St., New York City.
Howard E. Beedy, Oxford Paper Co., New York City.
Geo. F. Begnal, Baker Mfg. Co.
F. A. Beisel, Menasha Printing & Carton Co.
Thomas Bell, Falulah Paper Co.
J. E. Bellinger, De Grasse Paper Co.
H. Bennett, Valley Iron Works Co.
E. H. Benson, Regal Paper Co.
Dr. Theobald C. Bentzen, Whiting-Plover Paper Co.
W. M. Benzing, Champion Fibre Co.
E. A. Bergholtz, American Telephone & Telegraph Co.
Jos. F. Bergen, Hamersley Mfg. Co.
R. D. Bertschy, American Envelope Co.
Harold Bing, Paper & Textile Machinery Co.
Gordon Blanchard, Crocker-McElwain Co.
Dr. G. W. Blanco, Du Pont Rayon Co.
H. R. Boston, Stevens & Thompson Paper Co.
R. L. Bosworth, Crocker-McElwain Co.
J. A. Bothwell, Brompton Pulp & Paper Co.
Chas. W. Boyce, Forestry Service.
S. F. Boyd, International Paper Co.
L. M. Booth, Booth Chemical Co.
F. E. Bragg, Orono Pulp & Paper Co.
B. Branch, Canadian Barker Drum Co.
S. C. Brayton, Itasca Paper Co.
W. F. Bromley, Hammermill Paper Co.
H. H. Brown, 161 W. 72nd St., New York City.
H. P. Brown, New York State College of Forestry.
Nelson C. Brown, New York State College of Forestry.
D. K. Brown, Neenah Paper Co.
H. Luther Brown, Brown Paper Mill Co.
F. E. Brothy, International Paper Co.
Samuel Bruyn, Finch, Pruyn & Co.
E. S. Bryant, Boston, Mass.
S. B. Bugge, Tomahawk Kraft Paper Co.
Russell A. Buhrer, Union Wax & Tissue Paper Co.
J. G. Bullard, Warren Manufacturing Co.
Alfred Bunge, 500 Fifth Avenue, New York City.
H. V. Burgee, Neenah Paper Co.
A. H. Burns, Allis-Chalmers Co.
Kendrick Burns, S. D. Warren Co.
Arthur M. Burr, Edwin T. Garrett Co.
S. L. Bush, Crocker-McElwain Co.
C. A. Buskirk, Rex Paper Co.
J. K. Burwell, E. I. Du Pont De Nemours & Co., Inc.
Stanley Byron, Hammermill Paper Co.

C

Donald Cable, Oxford Paper Co.
Geo. J. Cadwell, American Writing Paper Co.
E. P. Cameron, Forest Products Laboratories of Canada.
James Cameron, Cameron Machine Co., 61 Poplar St., Brooklyn, N. Y.
H. R. Cantine, Martin Cantine Co.
James L. Carey, James L. Carey.
P. W. Carr, National Aniline & Chemical Co., New York City.
F. T. Carson, Bureau of Standards.
Louis Carten, Standard Paper Co.
Geo. A. Carter, Government Printing Office.
W. L. Carter, Nashua Gummed & Coated Paper Co.
Austin Cary, U. S. Forest Service.
V. B. Case, Papermakers Importing Co.
M. L. Caust, Beaver Products Co.
C. W. Chabot, Hammermill Paper Co.
E. C. Chadwick, L. L. Brown Paper Co.
Philip S. Chadwick, Chapin & Gould Paper Co.
R. H. Chapin, Millers Falls Paper Co.
H. L. Charles, E. Z. Opener Bag Co.
H. H. Chase, Brown Co.
H. L. Cheney, Paul A. Sorg Paper Co.
J. J. Chramzoff, New Plant Construction of the Volga Paper & Pulp Mills, Nischny-Novgorod, Balachma.
H. L. Churchill, Finch, Pruyn & Co.
Lewis L. Claflin, Erving Paper Mills.
A. B. Clark, J. O. Ross Engineering Corp.
Norman Clark, E. I. Du Pont De Nemours & Co., Inc.
C. J. Clegg, Mathieson Alkali Works.
Max Cline, International Paper Co.
A. D. Coffin, C. H. Dexter & Sons, Inc.
G. H. Collingwood, U. S. Forest Service & Extension Service of U. S. D. A.
G. N. Collins, Dill & Collins.
Lewis T. Condon, Continental Paper & Bag Mills Corp., Philadelphia, Pa.
Joseph M. Conway, Hoberg Paper & Fibre Co.
O. L. Cook, Lehigh Lime Co.
C. H. Cooley, Taylor-Logan Co. Papermakers.
E. S. Cooley, West Virginia Pulp & Paper Co.
P. T. Coolidge, Consulting Forester.
H. B. Collins, Dill & Collins Co.
I. H. Copeland, Tidewater Paper Mills Co., Brooklyn, N. Y.
S. B. Copeland, Eastern Mfg. Co.
John Cornell, Paper Mill, New York.
F. N. Countiss, Martin Cantine Co., 501 Fifth Ave., New York.
H. J. Corwin, Oglesby Paper Co.
A. F. Cosby, American Writing Paper Co.
J. B. Cowie, Orono Pulp & Paper Co.
Edward B. Cowles, American Engineering Co., Philadelphia, Pa.
Walter J. Cox, Paterson Parchment Paper Co.
J. H. Coy, Flambeau Paper Co.
C. H. Coye, C. H. Dexter & Sons, Inc.
Geo. E. Crafts, Orono Pulp & Paper Co.
H. J. Craig, Bingham, N. Y.
W. M. Crane, Jr., Crane & Co.
C. A. Crocker, Crocker-McElwain Co.
D. A. Crocker, American Paper & Pulp Association.
W. H. Croft, Esleeck Mfg. Co.
W. W. Cronkhite, General Electric Co.
T. L. Crossley, Industrial Laboratories.
F. E. Cuddeback, General Electric Co., Syracuse, N. Y.
Fred A. Cummings, U. S. Envelope Co.
W. S. Cummings, Chemical Paper Mfg. Co.
F. A. Curtis, American Writing Paper Co.
H. H. Curtis, Consolidated Water Power & Paper Co.
H. L. Cutler, Black-Clawson Co.
L. W. Crouse, Arabol Mfg. Co.

D

A. L. Dale, Paper Industry.
E. C. Daley, Port Huron Sulphite & Paper Co.
A. B. Daniels, L. L. Brown Paper Co.
A. K. Das Gupta, Oxford Paper Co.
Samuel Daumen, M. Gottesman Co., New York City.
John F. Davis, Cambridge, Mass.
S. Davis, Paper Industry, New York City.
C. S. Davis, Water Falls Paper Mills.
J. A. DeCew, Process Engineers, Inc., 501 Fifth Ave., New York City.
R. M. DeCew, Process Engineers, Inc., 501 Fifth Ave., New York City.
C. D. Demers, Union Bag & Paper Corp.
Phillips Dennett, Bird Machine Co.
V. S. Denison, Paper & Textile Machinery Co.
W. F. Dewey, B. D. Rising Paper Co.
J. C. Dieffenderfer, Paper Makers Chemical Co.
M. L. Dinkelspiel, National Paper Products Co.
W. H. Dittol, Ohio Dept. of Health.
M. C. Dobrow, Writing Paper Mfrs. Association.
R. B. Donnelley, Central Waxed Paper Co.
F. E. Donovan, United Paper Co.
A. B. C. Drew.
R. H. Dufault, E. I. Du Pont De Nemours & Co., Inc.
C. E. Dunbar, Louis De Jonge Co., New York City.
A. C. Dunham, Supply and Equipment Association, New York City.
James H. Hazelwood, Barber Asphalt Co.
W. Lloyd Heath, Mead Patton & Co.
J. F. Dumifer, Miami Paper Co.
Theo. W. Dunn, Dunn Sulphite & Paper Co.

E

G. A. Eastwood, Parsons Paper Co.
E. B. Eddy, National Paper Products Co.
F. J. Edmonds, Wausau Paper Mills Co.
V. P. Edwardes, Forest Products Laboratory.
Stanley J. Eisner, Newark Paraffine & Parchment Paper Co., New York City.
Wm. J. Eisner, Newark Paraffine & Parchment Paper Co., 120 W. 42nd St., New York City.
Ivar Ekholm, National Aniline & Chemical Co., New York City.
H. W. Ellerson, Albemarle Paper Mfg. Co.
G. F. Enderlein, Wausau Sulphate Fibre Co.
Wm. S. Epply, Hammermill Paper Co.
J. Erichsen, Atterbury & McKelvey Co., New York City.
O. H. Eschholz, Westinghouse Electric & Mfg. Co.
C. M. Eshelman, Cameron Machine Co., 61 Poplar St., Brooklyn, N. Y.
Irving N. Esleeck, Esleeck Mfg. Co.
D. C. Everest, Marathon Paper Mills Co.
R. D. W. Ewing, American Writing Paper Co.

F

H. S. Faram, Watervliet Paper Co.
F. C. Farnsworth, Farnsworth Company.
R. R. Fenska, New York State College of Forestry.
G. K. Ferguson, Watervliet Paper Co.
G. A. Filer, Cornell Wood Products Co.
C. H. Files, International Paper Co., New York City.
James M. Finch, Bell Telephone Laboratories, 463 West St., New York City.
Paul S. Fiske, Parker-Young Co.
A. E. Fivaz, U. S. Department of Agriculture.
S. W. Fletcher, J. O. Ross Engineering Co., New York City.
A. M. Forsythe, American Writing Paper Co.
N. N. Fowler, Hampden Glazed Paper Co., 501 Fifth Ave., New York City.
Ralph N. Fowler, Hampden Glazed Paper & Card Co.
B. A. Franklin, Strathmore Paper Co.
E. V. Fox, Tomahawk Kraft Paper Co.
James Foxgrover, Western Paper Makers Chemical Co.
E. B. Fritz, Paper Industry.

G

G. A. Gardner, M. Gottesman Co., New York City.
O. P. Gebhart, Miami Paper Co.
G. P. Genberg, Fraser Company, Ltd.
C. J. George, Harmon Paper Co.
George B. Gibson, Wausau Sulphate Fibre Co.
G. W. Gilkey, Michigan Paper Co.
A. G. Gilman, Allied Paper Mills.
Horace M. Gimlin, Hawthorne Paper Co.
P. H. Glatfelter, P. H. Glatfelter Co.
G. H. Gleason, G. H. Gleason.
A. F. Gluck, Coated Paper Products Co.
Otto Gceppinger, Armstrong Machine Works.
D. S. Gottesman, M. Gottesman Co., New York City.
J. H. Graff, Brown Co.
E. E. Grant, Crystal Tissue Co.
C. S. Gravatt, Western Union.
Wm. Greeley, F. C. Huyck & Sons.
Geo. E. Green, Niagara Paper Mills.
H. B. Green, Niagara Paper Mills.
W. D. Gregor, Newton Falls Paper Co.
Philip W. Gridley, Crocker-McElwain Co.
A. E. Griffen, Jessup & Moor Paper Co.
Martin L. Griffin, Amherst Club.
H. H. Griswald, C. H. Dexter & Sons, Inc
A. S. Guggenheimer, United Mfg. Co.

H

G. A. Hall, American Writing Paper Co.
R. H. Hall, Angier Corp.
C. S. Hamersley, Hamersley Mfg. Co.
G. K. Hamill, bureau of Standards.
E. H. Hanly, International Paper Co.
Edward J. Hansen, Centralia Envelope Co., Centralia, Ill.
E. J. Hansen, Fort Howard Paper Co.
H. H. Hanson, Eastern Mfg. Co.
R. O. Harper, B. D. Rising Paper Co.
T. W. Harrington, Crocker-McElwain Co.
H. H. Harrison, Crystal Tissue Co.
M. T. Hartley, Paul A. Sorg Paper Co.
A. R. Harvey, Gardner & Harvey Co.
Geo. W. Haskins, Drying Systems, Inc.
R. S. Hatch, Mead Pulp & Paper Co.
A. J. Haug, Nashua, N. H.
E. A. Haynes, Port Huron Sulphite & Paper Co.
B. F. Heintzman, Forest Service.

Those Who Attended the Convention

C. J. Hendricks, Consolidated Water Power & Paper Co.
Ralph B. Hersey, Hollingsworth & Vose Co.
A. E. Higgins, Centralia Envelope Co.
C. L. Higgins, Finch, Pruyn & Co.
R. H. Hill, Pulp Bleaching Corp., 39 Cortlandt St., New York City.
Arthur Hinds, Carthage Machine Co.
J. R. Hinkson, Hampden Glazed Paper & Card Co.
F. W. Hoefler, Phoenix Tissue Paper Co.
George S. Holmes, Brown Paper Mill Co.
J. E. Holmes, Crocker-McElwain Co.
C. A. Holmquist, State Health Dept., New York.
James J. Hood, A. M. Collins Mfg. Co.
A. H. Hooker, Jr., Hooker Electrochemical Co.
S. P. Hoopes, Finch, Pruyn & Co.
Geo. A. Horton, Kalamazoo Vegetable Parchment Co.
B. K. Hotchkiss, Hooker Electrochemical Co., New York City.
Geo. W. Houk, Wrenn Paper Co.
R. W. Hovey, Abitibi Power & Paper Co.
Phil A. Howard, American Paper Merchant.
Wm. W. Howe, Z. & W. M. Crane Co.
W. H. Howe, Defiance Paper Co.
Willis H. Howes, Knowlton Bros.
R. J. Hoyle, College of Forestry.
John L. Hoyt, United Filters Corp.
J. P. Hummel, Hummel-Ross Fibre Corp.
Fred Hummel, Hummel-Ross Fibre Corp.
J. W. Hurlbut, Bennington Waxed Paper Co.
C. W. Hurtubis, Hammermill Paper Co.
J. E. A. Hussey, International Paper Co.
J. E. Hyde, S. D. Warren Co.

I

W. E. Ihling, E. J. Keller Co.
T. H. Ireland, Crane Co.

J

C. H. Jaite, Jaite Co.
Arthur L. James, Holyoke Card & Paper Co.
H. L. Joachim, Muskegon, Mich.
C. A. Jobson, New York & Pennsylvania Co.
R. C. Johnson, International Paper Co.
Dr. Bjarne Johnsen, Hammermill Paper Co.
Dean Y. Johnston, The Chatfield & Woods Co.
E. J. Johnstone, Papermakers Chemical Co.

K

A. J. Kardakoff, Moscow, Zentrobumstrust.
John H. Karges, C. H. Dexter & Sons Co., Inc.
S. E. Kay, De Grasse Paper Co.
H. O. Keay, Laurentide Co., Ltd., Grand Mere.
T. J. Keenan, Paper Industry.
Frederick Kehew, Geo. W. Wheebright Paper Co.
R. S. Kellogg, News Print Service Bureau, New York City.
W. H. Kenety, Northwest Paper Co.
A. J. Kennedy, Hudson Falls.
G. F. Kennedy, Hercules Powder Co.
C. H. Kent, Kalbfleisch Corp.
E. E. Keough, L. L. Brown Paper Co.
J. R. Kessler, Dill & Collins Co.
Helen U. Kiely, American Writing Paper Co.
Stuart Kimberly, Kimberly-Clark Co.
J. A. Kindleberger, Kalamazoo Vegetable Parchment Co.
A. H. King, Crocker-McElwain Co.
Kenneth T. King, E. I. Du Pont De Nemours & Co., Inc.
H. C. Kinne, Bagley & Sewall Co.
C. J. Kittredge, Crane & Co.
J. H. Klein, York Haven Paper Co.
Otto F. Klein, Hammermill Paper Co.
Geo. W. Knowlton, Knowlton Bros.
Paul Koenig, Continental Paper & Bag Mills, New York City.
F. P. Klund, Hammermill Paper Co.
S. C. Knode, Albemarle Paper Mfg. Co.
Ivan M. Kolotiloff, New Plant Construction of the Volga Paper & Pulp Mills, Nischny-Novgorod, Balachna.
Otto Kress, Thilmany Pulp & Paper Co.
M. A. Krimmel, Hammermill Paper Co.

L

F. C. Ladd, Byron Weston Co.
R. H. Laftman, Bogalusa Paper Co.
G. H. Lafontaine, Chemical Engineer, New York.
D. Lake, Paper & Textile Machinery Co.
H. R. Landers, Hammermill Paper Co.
D. E. Lauderburn, Cons. Forest Engineer, Brunswick, Me.
D. E. Lauderburn, Cons. Forest Engineer, Brunswick, Me.
R. E. Leake, Niagara Paper Mills.
C. T. Leander, The Dorr Co., 247 Park Ave., New York City.
R. W. Leeper, H. S. Taylor.
Frederick S. Leonard, Fisk Paper Co.
J. Leo Levy, Crystal Tissue Co., Middletown, Ohio.
A. J. Lewthwaite, Crown Williamette Paper Mills.
J. A. Leyden, Hampden Glazed Paper Co.
C. E. Libby, New York State College of Forestry.
H. E. Lindquist, Chemical Paper Mfg. Co.
W. Allen Lindsay, Keystone Paper Mills Co.
Herbert Lippitt, International Paper Co.
J. S. Little, Western Electric Co.
H. H. Lockey, B. D. Rising Paper Co.
J. E. Lodewick, New York State College of Forestry.
L. E. Longstreth, Gardner & Harvey Co.
E. C. Looke, Valley Paper Co.
E. R. Low, Beaver Products Co., Bowery Savings Bank, New York City.
M. B. Lowe, Lowe Paper Co.
W. S. Lucey, Hammermill Paper Co.
F. M. Lugo, F. M. Lugo Co., New York City.
A. George Lutz, 200 Fifth Ave., New York City.
Frank Lynch, Seaman Paper Co.
J. L. Lynch, Lincoln Pulpwood Co.

M

B. T. McBain, Columbia Paper Mills.
G. M. McCarthy, American Writing Paper Co.
W. S. McClellan, P. H. Glatfelter Co.
A. A. McDiarmid, Price Bros. & Co.
R. G. Macdonald, Chemical & Metalurgical Engineering, New York City.
J. N. McDowell, Fox River Paper Co.
H. G. McDowell, Pusey & Jones Co.
R. F. McElwain, Crocker-McElwain Co.
John McEwan, American Tissue Mills.
Miss L. E. McGrath, Booth Chemical Co., Flushing, L. I.
Ralph H. McKee, Columbia University, New York City.
J. B. McNamara, International Paper Co.
J. L. McMorrow, Angier Corp.
Dr. J. L. A. MacDonald, Tullis Russell & Co., Ltd.
R. W. MacGregor, Ernest Scott Paper Co.
W. G. MaNaughton, Secretary, Technical Association of the Pulp and Paper Industry.
R. S. Madden, American Writing Paper Co.
Carl Magnus, Standard Paper Mfg. Co.
M. J. Maguire, Empire Size & Chemical Co.
L. W. Mahle, Ohio Boxboard Co.
Fred W. Main, Worthy Paper Co. Association.
R. Mair, Dill & Collins Co.
L. E. Mansfield, International Paper Co.
E. E. Mansfield, Cliff Paper Co.
C. F. Mansfield, Smith Paper Co., Lee, Mass.
Louis C. Marburg, Marburg Bros., 90 West St., New York City.
I. J. Marcuse, Bedford Pulp & Paper Co.
M. E. Marcuse, Bedford Pulp & Paper Co.
W. R. Maull, Dill & Collins Co.
W. D. Maxim, International Paper Co.
J. W. Maxson, Maxson Automatic Machinery Co.
H. S. Mead, Wrenn Paper Co.
A. Y. Meeker, Montclair, N. J.
Frank G. Merriam, Holyoke Card & Paper Co.
A. D. Merrill, Stebbins Engineering Corp.
C. H. Merrill, McLaurin-Jones Co.
Richard Messer, Virginia State Board of Health.
A. F. Meyer, Consulting Engineer.
W. J. Meyer, Brown Paper Mill Co.
A. L. Miller, Crown Willamette Paper Co.
J. D. Miller, York Haven Paper Co.
O. A. Miller, B. D. Rising Paper Co.
P. K. Miller, Finch, Pruyn Lumber Co.
R. N. Miller, Forest Products Laboratory.
W. H. Millspaugh, Sandusky Foundry & Machine Co.
Miss Jessie E. Minor, Collins Mfg. Co.
Ogden Minton, Greenwich, Conn.
W. G. Mitchell, Price Bros. & Co., Ltd., Kenogami, Canada.
W. B. Mix, Society of American Foresters.
J. S. Montgomery, McLaurin-Jones Co.
W. D. Mooney, International Pulp Co.
A. W. Moore, Shawmut Waxed Paper Co.
C. H. Morian, Cherry River Paper Co.
Joseph A. Moses, Falulah Paper Co.
G. Stanley Moss, Valley Paper Co.
M. E. Moyer, West Carrollton Parchment Co.
W. A. Munro, Munising Paper Co.

N

Fred Naegeli, R. T. Vanderbilt Co.
Alfred Nalle, Hummel-Ross Fibre Corp.
W. E. Nash, Nekoosa-Edwards Paper Co.
E. H. Naylor, Writing Paper Manufacturers Association.
M. Nelson, Bedford Pulp & Paper Co.
Herbert B. Newton, Newton Paper Co.
A. W. Nickerson, Process Engineers, Inc., 501 Fifth Ave., New York City.
A. K. Nicholson, Hollingsworth & Vose Co
G. Niklasson, Western Quebec Paper Mills.
W. A. Nivling, Huron Milling Co.
W. L. Nixon, American Writing Paper Co.
J. H. Noble, Oliver Continuous Filter Co.
Otto Nordstrom, Otto Nordstrom Co.
C. J. Nordenswan, Hercules Powder Co.
S. Norman, Munising Paper Co.
H. P. H. Norstrand, Saranac Pulp & Paper Co.

O

E. A. Oberweiser, Whiting-Plover Paper Co.
W. G. O'Connell, Z. & W. M. Crane, Inc.
J. J. O'Connor, Mead Pulp & Paper Co.
M. B. Olmsted, Fox River Paper Co.
E. Olsson, Chesapeake Corp.
Geo. N. Ostrander, Finch, Pruyn & Co.

P

Felix Pagenstecher, Bryant Paper Co.
L. J. Parant, St. Croix Paper Co.
John L. Parsons, Hammermill Paper Co.
Clifford Patch, Orono Pulp & Paper Co.
R. W. Patterson, American Writing Paper Co., 127 W. 80th St., New York City.
R. L. Pease, Knowlton Bros.
R. Q. Pease, Nashua River Paper Co.
Edwin D. Peck, Secretary, Salesmen's Association, New York City.
H. L. Peckham, Hammermill Paper Co.
Walter E. Perry, Chemical Paper Mfg. Co.
M. F. Peterson, U. S. Envelope Co.
B. M. Petrie, Eastern Mfg. Co.
C. H. Phipps, Watab Paper Co.
R. C. Pierce, Crane & Co.
Dr. L. E. Pitkin, Byron Weston Co.
A. F. Platt, Hollingsworth & Vose Co.
A. W. Pond, Western Electric Co., Chicago, Ill.
L. D. Post, Paper Mill, New York City.
J. W. Powell, Allied Paper Co.
A. T. Pratt, Paterson Parchment Paper Co.
R. W. J. Prevost, Foreign Paper Mills, 72 Duane St., New York City.
R. P. Prichard, College of Forestry.
J. E. Prouty, United Paper Co.
Robert W. Pryor, Jr., Pulp Bleaching Corp., New York City.

Q

B. D. Quarrie, Paper & Textile Machinery Co.
R. J. Quinn, Mathieson Alkali Works, New York City.
D. L. Quirk, Jr., Peninsular Paper Co.

R

Harold R. Rafton, Raffold Company of America.
Z. W. Ranck, Crystal Tissue Co.
D. G. Rankin, N. Y. State Conservation Commission.
E. Rantoul, International Paper Co., New York City.
Homer F. Ray, Scott Paper Co.
W. J. Raybold, B. D. Rising Paper Co.
W. L. Raymond, International Paper Co.
G. F. Reale, Hooker Electrochemical Co., New York City.
A. B. Recknagel, Empire State Forest Association, 31 Garden Place, Brooklyn, N. Y.
E. O. Reed, Government Printing Office.
Joseph D. Reed, Jr., Champion Coated Paper Co.
Robert R. Reed, Perkins-Goodwin Co.
E. Reines, Paper Industry, 18 E. 41st St., New York City.
H. H. Reynolds, B. D. Rising Paper Co.
I. S. Reynolds, Nekoosa-Edwards Paper Co.
C. E. Rice, International Paper Co.
H. M. Rice, E. I. Du Pont De Nemours & Co., Inc.
C. F. Rhodes, International Paper Co.
Carl Richter, Vera Chemical Corp.
J. B. Rieg, Irving Paper Mills.
Mortimer Riemer, Alling & Cory, New York City.
Sabin Robbins, Sabin Robbins Paper Co.
E. B. Roberts, Bemis Bros. Bag Co.
J. R. Roberts, E. I. Du Pont De Nemours & Co., Inc.
Reuben Robertson, Champion Fibre Co.
W. D. Robertson, McLaurin-Jones Co.
Wm. F. Robertson, Empire Size & Chemical Corp.
C. P. Robinson, The Borregaard Co., Inc., Waterfalls Paper Mills.
J. T. Robinson, American Writing Paper Co.
O. Roe, Individual Drinking Cup Co.
E. V. Romain, General Naval Stores Co.
E. H. Roorbach, Harmon Paper Co.
C. T. Roos, U. S. Envelope Co.
Mr. Rosenbaum, Hamersley Mfg. Co.
J. O. Ross, J. O. Ross Engineering Corp., New York City.
F. C. Rowley, International Paper Co., Philadelphia, Pa.
J. R. Russell, Marathon Paper Mills Co.

Those Who Attended the Convention

S

C. F. Sammet, Crane & Co.
Frank A. Sanborn, McLaurin-Jones Co.
J. E. Sanborn, Strathmore Paper Co.
A. L. Satterthwaite, E. I. Du Pont De Nemours & Co., Inc.
F. Henry Savage, International Paper Co.
R. H. Savage, Mead Pulp & Paper Co.
Thos. H. Savery, Jr., Nash Engineering Co., Chicago, Ill.
Wm. H. Savery, Harpers Ferry Paper Co.
Wm. E. Sayle, U. S. Envelope Co.
G. H. Sayler, Dennison Mfg. Co.
E. G. Schmidt, International Paper Co.
J. C. Schmidt, E. I. Du Pont De Nemours & Co., Inc.
H. D. Schmidt, Schmidt & Ault Paper Co.
C. C. Schneider, Knowlton Bros.
John Schniewind, Foreign Paper Mills, Inc.
Warren J. Scott, State Sanitary Engineer, Connecticut, 610 Riverside Drive, New York City.
B. W. Scribner, Bureau of Standards, Department of Commerce.
R. T. Scully, General Electric Co.
Stewart E. Seaman, Eastern Mfg. Co.
P. C. Servaas, Bryant Paper Co.
M. B. Shaw, Bureau of Standards, Washington, D. C.
Edward Sheahan, Manistee Pulp & Paper Co.
J. B. Shepherd, Peninsular Paper Co.
D. L. Sherk, Oxford Paper Co., New York City.
Dr. Rudolph Sieber, Kramfors, A/B., Sweden.
A. J. Sigel, M. Gottesman Co., New York City.
F. T. E. Sisson, Racquette River Paper Co.
Geo. W. Sisson, Jr., Racquette River Paper Co.
L. H. Sisson, Racquette River Paper Co.
N. J. Skinner, Skinner, Sherman & Esselen.
J. Slack, Adirondack Mineral Co.
R. Smith, Keith Paper Co.
C. W. Smith, Miamisburg Paper Co.
A. F. Smith, General Electric Co.
D. A. Smith, District of Columbia Paper Mfg. Co.
E. H. Smith, Papermakers Importing Co.
H. A. Smith, Hamersley Mfg. Co.
Richmond W. Smith, Bird Machine Co.
Roger D. Smith, S. D. Warren Co.
J. D. Solberg, Beaver Products Co.
Edward Southworth, Southworth Company.
G. K. Spence, New York & Pennsylvania, Inc.
O. W. Spicer, Society of American Foresters.
C. W. Spickerman, Whiting-Plover Paper Co.
H. E. Stafford.
S. A. Staege, Westinghouse Electric & Mfg. Co.
E. E. Staub, Bayless Mfg. Corp.
B. D. Steadman, Standard Paper Mfg. Co.
P. Stepanoff, Amtorg Trading Corp.
J. N. Stephenson, Pulp & Paper Magazine of Canada.
H. K. Steptoe, Philadelphia Quartz Co.
E. B. Sterling, West End Paper Co.
R. O. Sternberger, Tidewater Paper Mills, Brooklyn, N. Y.
W. L. Stevenson, Pennsylvania Department of Health.
N. S. Stone, Wausau Sulphite Fibre Co.
Austin P. Story, Chillicothe Paper Co.
R. I. Straus, American Paper Co.
W. D. Stroud, F. C. Huyck & Sons.
E. Sudermeister, S. D. Warren Co.
W. J. Sullivan, Grandfather's Falls Paper Co.
B. S. Summers, 21 Minetta Lane, New York City.
L. T. Summers, B. S. Summers, 21 Minetta Lane, New York City.
O. R. Summerville, Knowlton Products.
A. E. Suter, Bogalusa Paper Co.
W. H. Swanson, Forest Products Laboratory.

T

F. E. Taylor, Taylor-Logan Co. Papermakers, Advertisers Paper Mills.
H. S. Taylor, H. S. Taylor.
J. C. Taylor, Crane & Co.
R. R. Taylor, Scott Paper Co.
George Teren, American Writing Paper Co.
W. A. Taylor, La Motte Chemical Products Co.
E. L. Tewksbury, Stowe & Woodward Co.
C. K. Textor, Northwest Paper Co.
W. H. Theroux, Paper & Textile Machinery Co.
B. M. Thomas, Cornell Wood Products Co.
L. A. Thompson, Paper Makers Chemical Co.
C. B. Thorne, Riordon Pulp Corp.
John Traquir, Mead Pulp & Paper Co.
E. L. Troop, P. H. Glatfelter Co.
A. M. Tucker, Catskill Power Corp.
E. C. Tucker, Crocker-McElwain Co.
P. Y. Tumy, General Electric Co.
H. H. Turner, Defiance Paper Co.

U

T. M. Uptegraff, Defiance Paper Co.

V

I. O. Van Duger, Louise De Jonge & Co.
John B. Van Horn, Holyoke Card & Paper Co.
A. S. Van Houten, Hamersley Mfg. Co.
E. Van Roden, International Paper Co.
Charles D. Vierginer, Stecher Lithographic Co.
Henry Voltman, Hamersley Mfg. Co.

W

J. M. Wade, General Electric Co.
Chas. K. Wadham, Z. & W. M. Crane Co.
G. R. Wadleigh, West Virginia Pulp & Paper Co.
C. L. Wagner, J. O. Ross Engineering Co., New York City.
Perry S. Wagner, Diana Paper Co.
E. C. Walker, Collins Mfg. Co.
H. G. Walker, Western Electric Co.
J. R. Wallace, Laurentide Co.
J. J. Wall, General Electric Co.
Thos. Compton Walsh, Hollingsworth & Vose Co.
J. M. Ward, Detroit Sulphite Pulp & Paper Co.
A. E. Warren, Harmon Paper Co.
D. F. Warren, Harmon Paper Co.
J. J. Warren, Harmon Paper Co.
R. T. Warren, Harmon Paper Co.
W. J. Warren, Hampden Glazed Paper Co.
Louis F. Warrick, Asst. State Sanitary Engineer of Wisconsin.
H. D. Waterbury, Hooker Electrochemical Co., New York City.
R. S. Watson, Allis-Chalmers Co.
Fred Webster, American Writing Paper Co.
W. T. Webster, Dill & Collins Co.
John Wefring, Water Falls Paper Mills.
P. F. Wehmer, Electrical Testing Laboratory.
W. N. Wilkinson, Union Sulphur Co.
L. Vincent Welch, Union Screen Plate Co.
R. G. Westad, Water Falls Paper Mills, 200 Fifth avenue, New York City.
J. Westergaard, Atterbury & McKelvey.
D. P. Weston, Esleeck Mfg. Co.
H. E. Weston, New York State College of Forestry.
M. Westveld, Northeastern Forest Equipment Station.
A. R. White, Michigan Electrochemical Co.
F. P. Wilder, Diana Paper Co.
Chas. K. Wilkinson, Kent Paper Co.
F. M. Williams, Williams Apparatus Co.
W. V. Williams, Beckett Paper Co.
Ellwood Wilson, Laurentide Co.
Norman W. Wilson, Hammermill Paper Co.
S. L. Wilson, American Writing Paper Co.
Herbert A. Wingate, C. H. Dexter & Sons, Inc.
S. F. Woenschel, Hammermill Paper Co.
E. P. Woods, Tonawanda Paper Corp.
Fred L. Wood, U. S. Envelope Co.
L. G. Wood, Northern Paper Mills.
J. B. Woodruff, J. B. Woodruff Co.
G. D. Wyatt, Paper Industry.

Y

H. F. Yaekel, International Paper Co., Pittsburgh, Pa.
L. M. Yoerg, American Writing Paper Co.
Dana C. York, Oxford Paper Co.
E. F. Yulke, Continental Paper & Bag Mills Corp.
H. J. Zittel, Louis De Jonge & Co., New York City.

TO BUILD MILL AT MORGAN CITY, LA.

The purchase by the Dixie Pulp and Paper Company of New Orleans of a fifty-three acre factory site at Morgan City, La., for a large plant which will manufacture paper from pulp made of tupelo gum, brings to a head investigations and tests that have been going on for years to determine the worth of this material for paper. The purchase was completed last week by E. A. McIlhenny, president of the company, who came here accompanied by V. D. Simons, industrial engineer of Chicago and his assistant, Harry Gay.

The site of the new factory is said to be ideal for the purpose. It fronts upon Bayou Boeuf, a deep water ways and the main channel of the Intracoastal Canal with nearby connections with the Atchafalaya River. The main line of the Southern Pacific Railroad crosses the factory's site about 1,000 feet from the Bayou and the main line of the Old Spanish Trail Highway parallels the road at this point.

Water transportation in this section is an advantage of paramount importance. This city is the central point in a water way system embracing about 1,000 miles of navigable rivers, lakes and bayous, comprising the Atchafalaya basin. In the Atchafalaya basin are hundreds of thousands of acres of cut-over swamp lands from a large portion of which merchantable timber has been cut.

Wide attention has been created among paper manufacturers of late as the facts have been known regarding the potentialities of this section as a paper center. The experiments have shown that some of the other woods native here, as well as tupelo and even some of the wild grasses indigenous to this territory, may prove of great value as raw material for paper making. If, however, nothing but the tupelo proves of commercial value, there still remains sufficient raw material to maintain a number of great factories in the immediate neighborhood of Morgan City.

That this city is the logical location for any of the plants located in the Atchafalaya basin is plain from its geographical position in relation to transportation facilities. The pulp wood acreage lies mainly to the northward of the city and the wood can be floated directly to Morgan City where rail and water facilities meet. The Intracoastal Canal, when completed, will furnish inland water transportation between the upper Mississippi by way of Plaquemine and also from New Orleans via Morgan City to the great industrial centers of South Texas. The two routes from the Mississippi westward meet at Morgan City.

In addition to the combined advantages of location and transportation facilities, Morgan City is favored by having almost at arms length the greatest salt and sulphur supplies in the world and an incipient lime industry, through the conversion of the great shell supplies into finished lime.

As the result of these combined advantages, an industrial center of importance is being built up here on the wonderful resources of the South Louisiana Gulf Coast.

WAYAGAMACK
PULP & PAPER Co. LTD.

MANUFACTURERS OF

SULPHATE PULP, KRAFT PAPER
AND
NEWSPRINT

THREE RIVERS, Quebec
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C. R. WHITEHEAD Pres. and Genl. Manager
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WAYAGAMACK PULP and PAPER
COMPANY LIMITED
THREE RIVERS. CANADA

WAYAGAMACK

THE PIONEER IN PRODUCTION OF KRAFT IN CANADA.

Wayagamack Pulp and Paper Company Laid the Cornerstone in the Building of the Largest Paper Producing City in the World—Its Products Sold Over the Entire World.

By A. A. Tanyane

ALADDIN, the hero of "Arabian Nights," never performed a more entrancing feat than what has been accomplished on the northern shores of the St. Lawrence River at what is known as Three Rivers, Quebec, Canada. Fifteen years ago Three Rivers was virtually a small town and its identity was known only from the fact that it was a lumbering center and a railroad stop midway between two historical cities of Canada, Montreal and Quebec. Today is has a population of over 30,000 and possesses the distinction of being the largest paper producing city of the world, there being produced within its confines 375,000 tons of various grades of paper and pulp annually.

The growth of this paper making city is one of the wonders of the world and gives it the leadership in connection with the paper making history of Canada. The Pulp and Paper Industry ranks third among Canada's industries, being led by agriculture and mining, but at its present rate of growth it will in a very few years become the leading industry as a result of the vision of pioneers in the production of pulp and paper who are blazing the trail for others to continue the development of what is recognized as the most stable of all industries. About forty years ago the first pulp mill was built in Canada and today there are in operation 193 pulp and paper mills, 113 of which are pulp mills, the remaining producing various grades of paper—fine writings, blotting, book, print and wrapping papers.

Wherever paper is used it may be said without fear of contradiction that the name of "Wayagamack" as identifying a special brand of paper is well established. Within the short space of time of fifteen years, the product of the Wayagamack Pulp and Paper Company, Limited—"Wayagamack Kraft" has found its way to every port of entry throughout the entire world. Within the last two months another product of this company, "Wayagamack Newsprint Paper" has started out to become equally as well known in every port of the world as is "Wayagamack Kraft."

These accomplishments are the climax of an industrial career of a man who fifteen years ago visualized the future development in the manufacture of pulp and paper in Canada and turned a romance of the industry into a reality. Up to the year 1912 very little was known of the manufacture of Kraft Paper in Canada, there being only an annual production at that time of about 5,000 tons, the balance of Canada's requirements being imported from Scandinavia. During that year the Wayagamack Pulp and Paper Company, Ltd., put into operation their mill, which has since grown to be the largest paper-mill in the world, whose energies were devoted solely to the manufacture of Kraft Paper.

The mills were built on Wayagamack Island, at Three Rivers, Quebec, where joins the St. Maurice and St. Lawrence Rivers. This enterprise is the culmination of an idea conceived in the mind of C. R. Whitehead, President of the Wayagamack Pulp and Paper Company, Ltd., who while on a fishing

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THE WORLD OVER
CANADIAN KRAFT
WAYAGAMACK
PURE KRAFT
SALES ORGANIZATION
CANADIAN KRAFT LIMITED
THREE RIVERS, CANADA
EXPORT DISTRIBUTORS OF WAYAGAMACK PRODUCTS

WAYAGAMACK

trip in the St. Maurice River valley was keen to observe the potential value of the immense forests of that section and then and there determined on erecting a Pulp and Paper Mill whose products would be noted the world over for their high standard of quality.

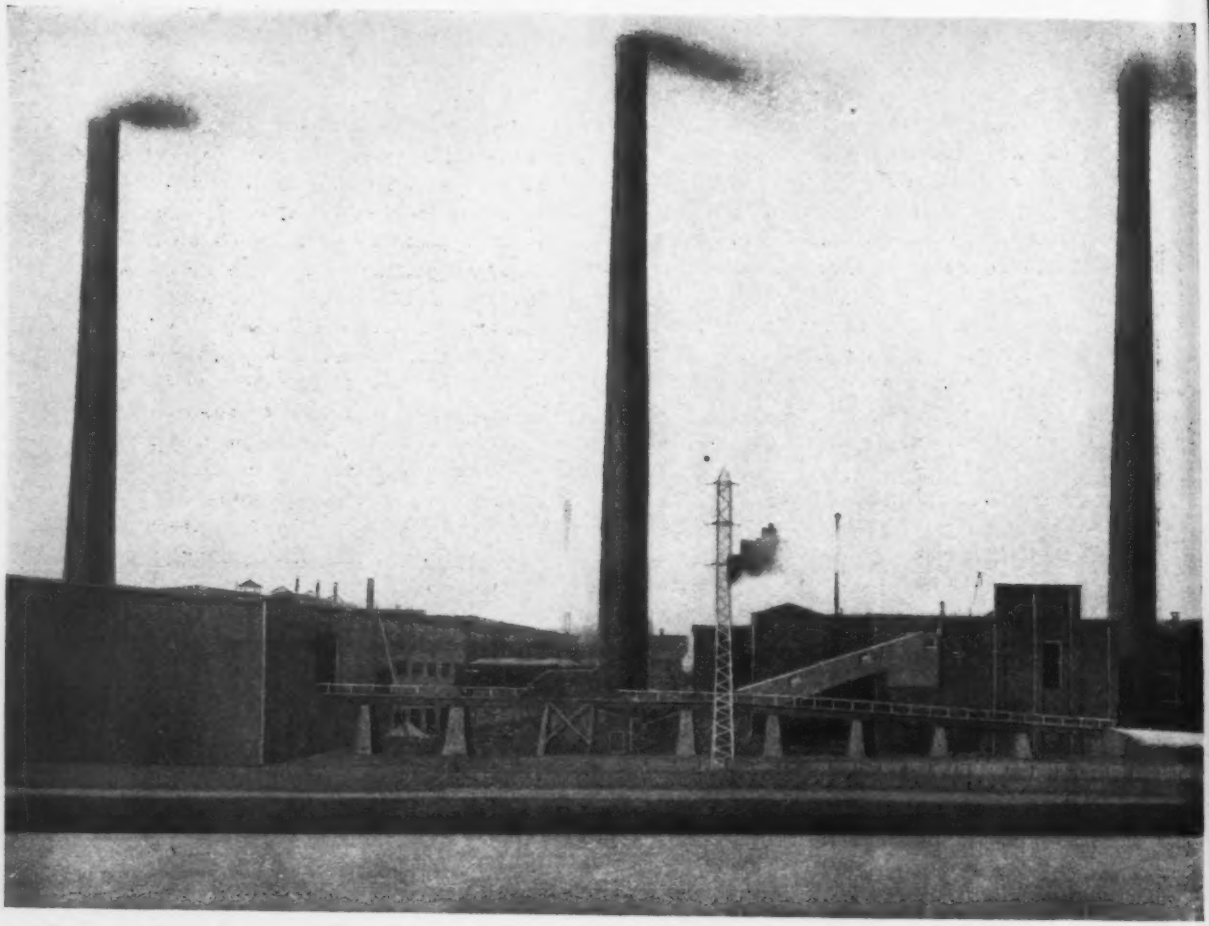
The first step in acquiring timber lands was the taking over of a tract of over eleven hundred square miles of forests which were known as the Baptist Timber Limits located in the St. Maurice River valley. The location of the mill at the mouth of the St. Maurice River is ideal for the economical handling of the pulpwood which is floated down the river to the conveyors which stack it in piles of mountainous size. To further perpetuate its supply of pulpwood, the company has added two timber limits, one on the Portneuf River, on the north shore of the St. Lawrence, which covers an area of four hundred and eighty-five square miles, and the other on the south shore of the St. Lawrence River, being the well-known Breakey Limits of four hundred and fifty square miles, situated on the York River in the Gaspe Peninsula. Visualizing the future is shown in selecting these three timber limits comprising over 2,000 square miles as the company is not only assured of an endless supply of pulpwood, but their being widely separated, though conveniently located to the plants, eliminates very largely the risk of their destruction by fire.

The foundation of the present-day enterprise of the Wayagamack Pulp and Paper Company, Ltd., was laid in 1910 when the company was incorporated by Dominion Charter. In 1912 the plant was completed and started producing. At the time of construction of this plant the total annual production of Kraft Paper in Canada amounted to about 5,000 tons. Today it exceeds 47,000 tons annually. The consumption of Kraft Paper in Canada in 1912 amounted approximately to about 8,000 tons annually and today it exceeds 35,000 tons, an increase due largely to the efforts of the Wayagamack organization in educating the consumers of Canada as to the various uses to which Kraft Paper can be applied.

The personnel of "Wayagamack" realizing the potential possibilities of "Wayagamack Kraft" for other uses than wrapping purposes, set about educating the Printing Craft to the advisability of using its product for attractive printing jobs. At first loath to believe an artistic printing job could be obtained by the use of Kraft Paper, the leading Craftsmen have come to appreciate its originality and novelty and are today using "Wayagamack Kraft" for booklet covers, Christmas cards and other high class printing jobs. The development in the use of "Wayagamack" for printing purposes has led to special attention being given to producing a grade of paper suitable for printing purposes. Not only does it receive special treatment in its finish, but exceptional care is exercised in the sorting of the sheets. This is fully observed in the finishing room where skilled employees after several years of apprenticeship, may be seen going over each sheet with a microscopic eye and casting aside what would seem to the average individual as perfectly good stock. Each individual identified with the production and sale of "Wayagamack Kraft" is jealous of the quality of the product and therefore takes a personal interest in maintaining the reputation which has been established for its high standard.

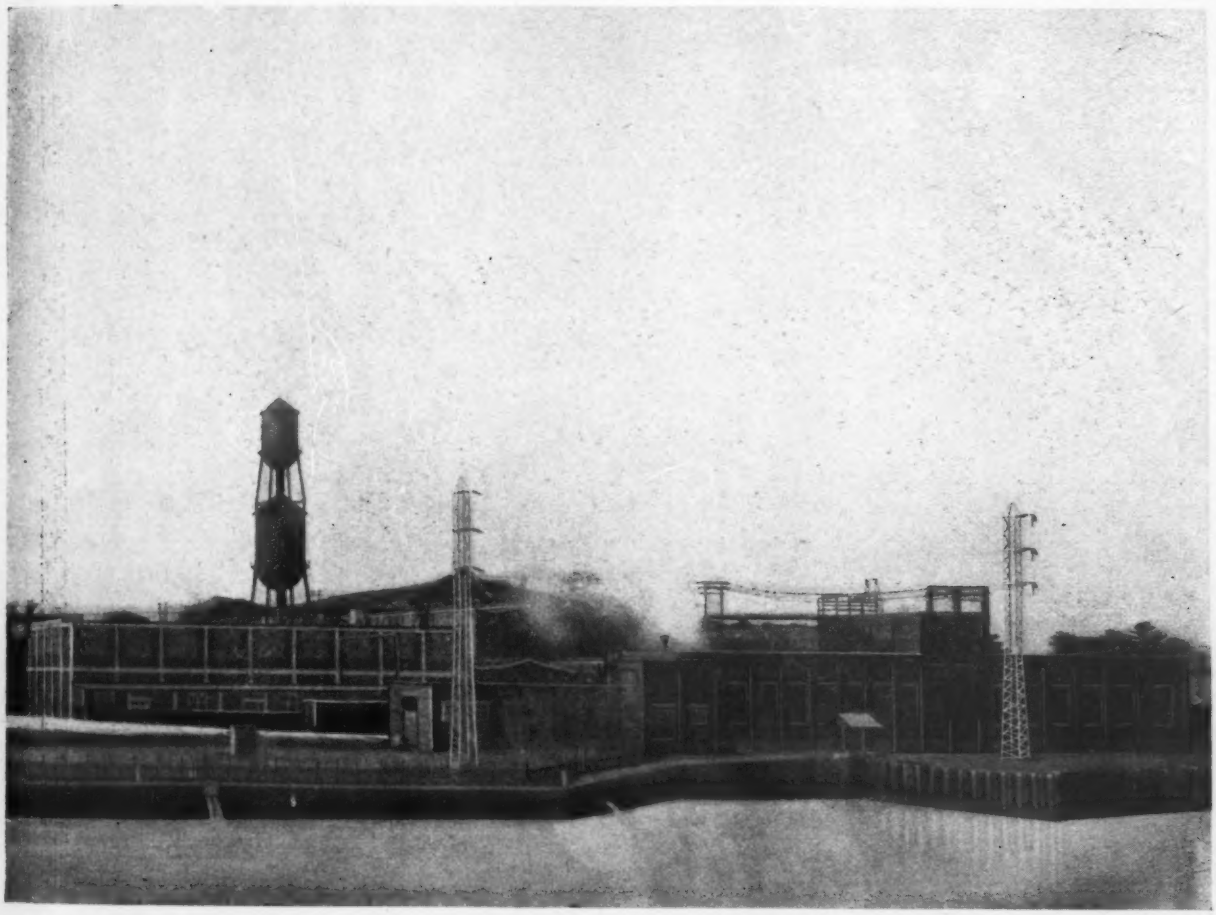
The Kraft Paper mill originally equipped with two Fourdrinier machines today is operating to full capacity seven machines, two Fourdriniers and five Yankee machines, having increased its production from 50 tons daily in 1912 to approximately 125 tons of

WAYAGAMACK PULP &



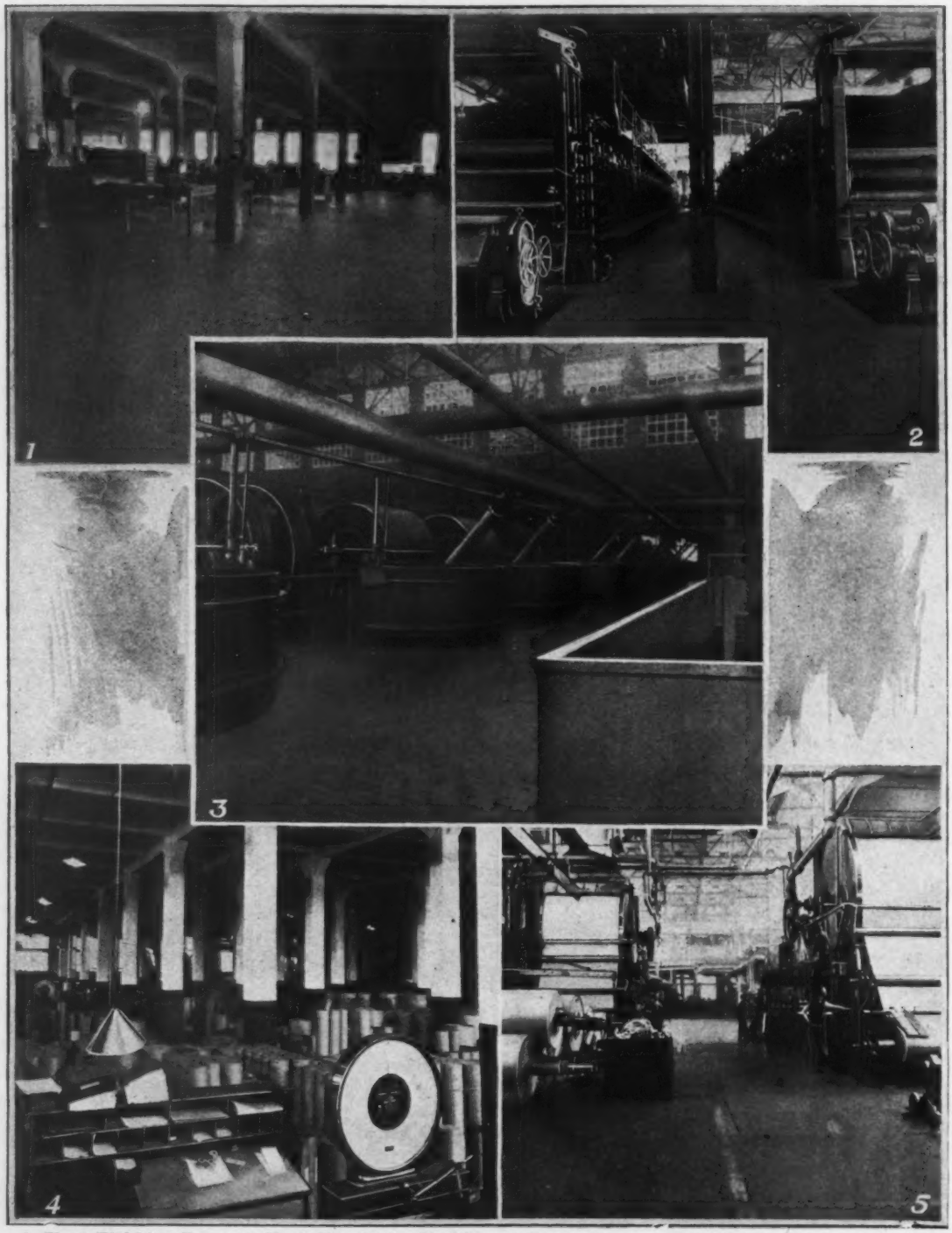
THREE RIVERS,

& PAPER CO. LTD.



QUEBEC CANADA

WAYAGAMACK



1. Sheet Finishing Room. 2. Kraft Fourdrinier Machines. 3. Beater Room. 4. Roll Finishing Room. 5. Yankee Machines.

WAYAGAMACK

Kraft Paper and 240 tons of Sulphate Pulp in 1925. In addition to a large steam plant housing eighteen Lancashire boilers, there is also a modernly equipped electric plant where current is received at 60,000 volts from the Shawinigan Water & Power Company development at Shawinigan Falls only a few miles distant from the plant.

Situated as it is on the St. Lawrence River, a waterway which is the ocean going channel between Montreal, Quebec and the ports of the world, (Montreal being the second largest port in North America), the Wayagamack Pulp and Paper Company, Ltd., has splendid facilities for the making and receiving of shipments by water, Three Rivers having a fine harbor and extensive docks where ocean-going vessels of the heaviest draught can be docked.

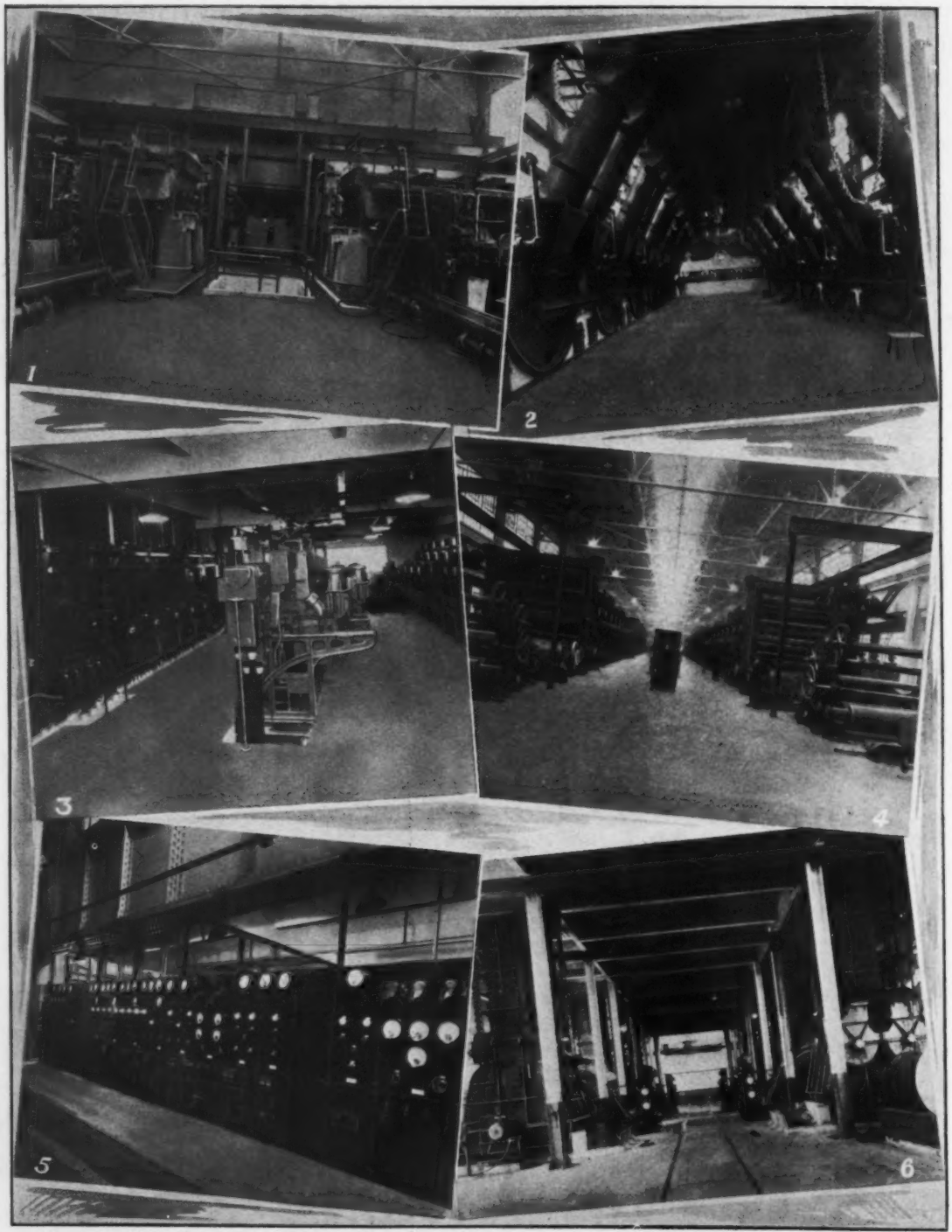
Having developed and perfected a process for manufacturing a high quality of Kraft Paper, the attention of the organization was next directed to the developing of an export business. It was fully realized in order to have their product retain its high quality from the moment it came off the machines until it was put into use by the ultimate consumer in foreign countries, that each shipment must be so packed as to insure its retaining its quality and character irrespective of what unfavorable conditions it encountered. To accomplish this there were installed hydraulic packing presses capable of turning out 70 tons of packed paper every 24 hours.

The cases are so well packed that they can be shipped to any place in the world without fear of the contents suffering the slightest damage. This fact has been demonstrated on several occasions when ships carrying cargoes of Wayagamack Kraft have met with disaster on the high seas and when the cargoes were salvaged, the contents of the Wayagamack packed bales were found to be in perfect condition. The company well prides itself on this important feature of its business which has gained for it an enviable reputation in all parts of the world.

The achievement in developing the production and sale of its Kraft Pulp and Kraft Papers led the company to make another advanced step in paper production—the building and equipping of a Groundwood and Newsprint mill with a capacity of 200 tons of Newsprint paper daily. Immediately this decision was arrived at there was organized Wayagamack News Limited, and through the British Trade Facilities Act Committee, they obtained £425,000 on the condition and understanding that this money should be spent in buying machinery and material for the plant in Great Britain. Wayagamack Pulp and Paper Company, Ltd., issued $1,500,000 Six and a half per cent Five year General Mortgage and Collateral Trust Gold bonds. The proceeds of these bonds was lent by Wayagamack Pulp and Paper Company, Ltd., to Wayagamack News Limited against which they gave Wayagamack Pulp and Paper Company, Ltd., security of $1,500,000 Six and a half per cent Fifteen year Second or General Mortgage bonds. The Wayagamack Pulp and Paper Company, Ltd., guarantees the British loan and undertakes to operate Wayagamack News, Limited, for a period of fifteen years.

"Action" is the outstanding motto of this organization. The entire personnel, from officers to the last employee is imbued with this spirit. This is exemplified by a decision arrived at on January 11, 1925, when plans were settled upon for the building and equipping of a two machine Newsprint mill and this mill was completed and in operation on December 17, 1925, producing a high quality Newsprint and shipping its first run to its customers. As practically all of the equipment for this new mill. including two 160" Fourdriniers, was built in England, one can

WAYAGAMACK



Newsprint Mill—1. Mixers and Wet End. 2. Steam Plant. 3. Main Switch Board. 4. Machine Room. 5. Grinding Room Switch Board. 6. Grinding Room.

visualize the speed with which the work was carried to completion. The equipment of this Newsprint mill is of the latest type of machinery, the result of careful and intensive planning, working for efficiency in its real meaning.

From the pulpwood pile, conveyors distribute the wood to eight huge Grinders, the first step in making the wood pulp, and thence the process follows in sequence with a rapidity, through agitators, stuff chests, mixers to the Fourdriniers, which causes one to hesitate and wonder if there is not some spot in the scheme of production which has been overlooked. This smoothness of operation is due to the fact that those responsible for creating this enterprise thoroughly studied their problems before making a move, no suggestion or criticism was passed up unheeded, with the result there are no frills in equipment to cause the slightest friction in the process of operation. Immediately connected with the Grinder room are two rooms in which are installed the electrical control switchboards and recording instruments which greatly facilitate the operation of the plants.

The machine room is equipped with a double traveling crane electrically operated and manned by operators who, in eight hour shifts, are on constant duty ready for any emergency which may arise. The two Fourdrinier machines in the Newsprint mill were started up on December 16, 1925, and on the following day the first reels of newsprint paper were being loaded for shipment to customers of the company. It was while this first run was being made that the company acted as host to a delegation of its directors and stockholders and others interested in observing what eleven months of intensive work had accomplished in the construction, equipment and starting of operations of what is regarded as the most modern of paper mills. Their silent expressions of amazement were a testimonial to the confidence they held for those who were instrumental in erecting this monument to industry and the future success of the business.

In the creating of this great enterprise the founders did not overlook making provision for the welfare of its employees. Attractive cottages have been built for the employees, equipped with modern conveniences and rented at reasonable rates. A fully equipped hospital with doctor and nurses is maintained and this feature is also carried out in its timber districts so that its woodsmen are always assured of promptly receiving first aid. There is also a club house, dance hall, bowling green, curling and skating rinks where employees and their families may enjoy themselves during the winter months, while provision is also made for summer sports. These welfare features are not carried out in a patronizing way as is evidenced by the spirit of comradeship and loyalty shown by the employees. A noticeable feature of this huge organization is the smooth running system with which its entire operation is carried on.

"Efficiency" with its overlapping details fully eliminated, enables the various department managers to place their hands on the pulse of every situation instantly it arises. The result is prompt action, manufacturing problems are quickly solved and customers' needs are fully and promptly attended to, which in addition to the high quality character of "Wayagamack" products has earned for the Company an enviable Good Will record.

WAYAGAMACK

SULPHATE PULP

—

KRAFT PAPER

(GLAZED AND UNGLAZED)

AND

NEWSPRINT

—

Shipping to World's Ports

THE WORLD OVER CANADIAN KRAFT

THE WORLD IS OUR MARKET

Technical Association Papers and Reports

Presented at the Annual Convention of the Technical Association of the Pulp and Paper Industry at the Waldorf-Astoria, New York, February 23 to 25, 1926—Representative Men of the Pulp and Paper Industry Throughout the Country Discuss Numerous Important Problems of Timely Interest

Report of the Committee on Waste

By G. D. Bearce, Chairman

The report of the Hoover Committee on the "Elimination of Waste in Industry" suggested to the paper industry that it should make a survey of the operating practice of all mills, and this resulted in the appointment of a Committee on Waste of TAPPI early in the year 1922. This committee made a study of waste problems in the paper industry and cooperated with various pulp and paper companies, the U. S. Forest Products Laboratory, and the Bureau of Standards in specific investigations. Several reports in regard to the various phases of waste were presented at subsequent meetings of the Technical Association with the result that a great deal of interest in waste problems has been created, especially those relating to white water or fiber and filler losses.

It is well recognized in the paper industry that the two outstanding physical wastes closely allied to the stream pollution problem are "white water losses" and "waste sulphite liquor." Chemical wastes from soda and sulphite mills, pollution of waters by carbon material from de-inked papers and the effluent from strawboard mills constitute important problems that should receive much consideration and study in the attempt to further improve waters used by paper mills. There are many other sources of possible wastes in the pulp and paper manufacturing processes such as heat, chemical and power losses, etc., which are of importance in the study of waste by many plants, but these are not closely identified with the problem of stream pollution.

White Water Losses

The recovery of the papermaking material in the effluent of any mill is a distinct problem at every plant. This study has been covered by the reports of the Committee on Waste previously mentioned, both in a general way and by the publication of specific data from a large number of tests on various types of stock saving equipment. It has been demonstrated by plants that have adopted adequate stock saving devices that the particular problem with which they are confronted can be solved with a reasonable degree of success providing the correct type of equipment is selected to meet the conditions and that it is properly installed and operated. While it is true that specialty and similar mills present a difficult problem, nevertheless it is possible to hold their white water losses to minimum by reclaiming the stock as near the paper machine as possible. Some mills have found it possible to locate stock savers so that they are virtually an integral part of the paper machine, and losses due to the change of grades or colors can be held to a minimum. Such stock, from a standpoint of quality and cleanliness, is as satisfactory as fresh paper making material provided that the reclamation system is as carefully attended to as the paper machine itself.

It is obvious that the reduction of material losses in the rejected white water from pulp and paper mills has a distinct bearing on the stream pollution problem. It is well recognized that a certain volume of water must be rejected from a paper mill because of the nature of the operation, but this can be held to a minimum by proper reuse of white water on the paper machine and in other parts of the mill together with the adoption of adequate reclamation systems. A measure of the reuse of white water is the gallons per ton of paper made. One news mill that buys its water finds it possible to operate in a satisfactory manner with 2,500 gallons per ton of paper, while the average water consumption in news mills is about 15,000 gallons per ton of paper. Many book and other mills have reduced their water requirements by a study of the problem. And it is obvious that the first and most important step in the reclamation of fiber is an effective study of the reuse of stock carrying waters. A number of mills are using white water showers on the paper machines, surplus water in washing stock, etc., and as a result the work of the stock saver is reduced to a minimum.

Stock saving equipment has been greatly improved during the past three or four years. This improvement has been stimulated by the interest of the mills in savealls of all types together with the willingness of the manufacturers to make more efficient equipment. Moreover, reclaiming principles in other industries have been adapted to paper mill conditions with a large degree of success.

The two major principles of stock reclamation are: 1. Filtration or straining, and 2. Sedimentation. Each type of equipment has its particular field and while no definite rules can be laid down as to the equipment best adapted to a mill making a certain grade of paper, in general the sedimentation type is best suited to white water that contains short fibered stock and an appreciable amount of filler or mineral matter, whereas the filter or wire strainer type is better adapted to medium or long fibered stock which is used without filler. However, both the sedimentation and the wire strainer or filter type of stock savers have been successfully used under varying conditions and on all kinds of white water.

Mill Operating Results

The stock losses in paper mills vary with the grade of paper as well as the individual plant. The estimated average loss throughout the industry, divided as to grades, is approximately as follows: Wrapping, 5 per cent; News, 7 per cent; Tissue, 10 per cent; Board, 10 per cent; and Book, 15 per cent. Assuming that it takes 110 tons of furnish to produce 100 tons of finished paper and that 80 per cent of the excess furnish is recoverable, the amount of paper making material that can be reclaimed is 8 tons per day. If the stock is valued at $40 per ton it represents a loss of $320 per day, or approximately $100,000 per year.

At a previous meeting of the Technical Association data from mills that have installed the most modern and best adapted type

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of stock saving equipment was presented. The figures given indicate that mills making book and similar grades of paper can operate their saveall equipment at an efficiency of 95 or 96 per cent, and the resultant losses in their effluent amount to approximately 0.5 per cent. It has been demonstrated that mills making groundwood papers are able to reduce their white water losses to less than 1.5 per cent based on the total weight of product made. The data previously presented also indicates that by the adoption of the correct type of stock saving equipment the material reclaimed will pay for the cost of the installation in less than 12 months. In one particular mill the stock recovered paid for the entire saveall installation in two months.

Stock Recovery

Other representative results are as follows:

NEWS SPECIALTY MILL

Stock in white water to saveall per day	6,572 lb.
Stock recovered per day	5,612 lb.
Efficiency of stock saver	95 %
Estimated yearly value of recovered stock	$25,000
Annual return on the investment	167 %

BOOK PAPER MILL

Stock in white water to saveall per day	4,250 lb.
Stock recovered per day	3,925 lb.
Efficiency of stock saver	93 %
Estimated yearly value of recovered stock	$37,200
Annual return on the investment	249 %

BOARD MILL

Stock in white water to saveall	5,200 lb.
Stock recovered per day	3,900 lb.
Efficiency of stock saver	75 %
Estimated yearly value of recovered stock	$12,000
Annual return on the investment	605 %

These results indicate that it is possible to operate almost any paper mill with a very small fiber loss, consequently, there need be little stream pollution due to effluent of this type coming away from the pulp or paper mill.

Waste Sulphite Liquor

The problem of utilizing and disposing of waste sulphite liquor is one of the most complex that any industry has ever had. Chemists, research engineers, and pulp and paper mills all over the world have investigated this problem from almost every angle, but as yet have been unable to recommend a universal satisfactory solution. Over seven hundred patents have been taken out covering some phase of waste sulphite liquor recovery which may be applicable under certain conditions. In Europe where this problem has been given a large amount of study a number of mills have been able to reclaim a small amount of industrial alcohol and other byproducts. Sweden is perhaps one of the outstanding countries to adopt this method of treating waste sulphite liquors. However, this does not eliminate the pollution problem unless subsequently burned or otherwise disposed of, because the reject from the process are as offensive as the original sulphite liquor itself.

It is apparently advantageous to combine the use of sulphite liquor as a fuel with the manufacture of industrial alcohol. This combination permits the fermentation of a stronger liquor and thereby saves installation and distillation expense due to the less volume of liquid handled. This method presents possibilities, although as far as known it has not been tried out in this country. One or two Swiss mills evaporate the liquor to about 50 per cent solids and use it as a fuel. Several mills in the United States, including the International Paper Company, West Virginia Pulp and Paper Company, Central Paper Company, York Haven Paper Company, and J. & J. Rogers Company, are evaporating their sulphite liquor and reclaiming the organic matter. This material has a limited use as a road or core binder or as a tanning material, and in one case has been combined with coal dust in the manufacture of fuel briquets. The reduction of sulphite liquor to powder form requires considerable equipment, consequently it necessitates a large capital investment. Therefore the operating costs are extremely high in proportion to the value of the material recovered. None of the processes so far used appears to be highly successful nor has any one been generally adopted.

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Mill Experiments in the U. S.

Several pulp and paper mills in the United States have experiments on the evaporation and burning of sulphite liquor. The Crown Willamette Paper Company has been using the Peebles type of evaporator for the last 12 months with varying degrees of success. The liquor is reduced to approximately 50 per cent solids and burned under the boilers by a method similar to that used with oil. About a year ago the West Virginia Pulp and Paper Company ran a six hour test to determine the possibility of using waste sulphite liquor as a fuel. The analysis of this liquor was as follows:

Combustible matter, per cent by weight	45.29
Water	49.65
Ash	5.06

This material was atomized by means of compressed air and fed into the furnace under a 350 hp. water tube boiler together with coal which was supplied by means of a Type E stoker. During this test 2,900 pounds of coal were fired and 27,693 pounds of sulphite liquor. The percentage of gross heat of both fuels available for use in the boiler was 89.1 per cent. The percentage of available heat utilized by the boiler was 61.0 per cent, and the efficiency of the boiler and furnace was 54.3 per cent. The heat balance based on both fuels as fired was quoted as follows:

Heat absorbed by boiler, B.t.u.	79,180,758	54.3
Loss due to evaporation of moisture in fuel	15,750,145	10.8
Loss due to heat carried away by dry gases	24,089,160	16.5
Losses unaccounted	26,570,549	18.4
Total	145,590,612	100.0

Considerable information is available regarding the concentration of waste sulphite liquors and several makes of evaporators have been used with considerable success. Data on burning the concentrated material is somewhat limited although it appears to be feasible. The E. B. Badger & Sons Company has made tentative experiments on the evaporation and utilization of waste sulphite liquor and considers that its use as a fuel is logical. They have supplied the following general estimates regarding the cost of equipment for a liquor reduction plant and the heat value of the recoverable materials.

50-Ton Waste Sulphite Liquor Recovery Plant Summary of Data

1. Waste sulphite liquor (W. S. L.) per ton pulp	2,000 gal.
2. Total W. S. L. per day 2,000 × 50	100,000 gal.
3. Weak liquor per hr. (20 hour operation)	
6° Be. or 10% solids	5,000 gal.
5,000 × 8.33 × 1.04	43,300 lb. per hr.
4. Available solids	4,330 lb. per hr.
5. Concentrated liquor (45% solids) from evaporator	9,650 lb. per hr.
6. Concentrated liquor (55% solids) from Pan	7,900 lb. per hr.
7. Total steam required for concentration, desulphurizing and heating purposes	12,000 lb. per hr.
8. Total steam available from burning solids (Heat value solids 8,000 B.t.u. per lb.) (Boiler efficiency assumed 75%)	26,000 lb. per hr.
9. Net steam available for plant operations, 8.—7.	14,000 lb. per hr.
10. Value of (9.) @ 50c per 1,000 lb.	$42,000 per year
11. Approximate cost of entire concentration and burning equipment installed	$60,000
12. Cost of operation (see Notes).	

NOTES.—The equipment consists of a preheater, desulphurizer, high speed quadruple effect evaporator, finishing pan and miscellaneous piping, tanks and pumps. It is assumed that space will be available in some part of the existing mill to install the equipment, consequently the cost of new buildings has not been included.

In the preparation of the liquor it first goes through the desulphurizing column to remove the SO_2 which is returned to the acid system. The liquor is next concentrated to about 45 per cent solids in evaporators designed for high velocity, thus preventing foaming and at the same time a minimum scaling of tube surfaces. The 45 per cent liquor is then preheated and further concentrated to 55 per cent solids in the finishing pan. It is proposed to burn the liquor on a chain grate stoker in a similar manner to the methods used in Europe. The concentrated liquor is distributed over the coal bed in a zigzag manner by a specially constructed machine. With this system alternate rows of dry coal and coal saturated with liquor pass to the fire zone and the combustion of the dry coal causes the final evaporation of the remaining water and burns the solids.

The cost of operation will vary with different mills and installations. One man per shift would be the only labor required to operate the system. Water is usually available at all mills and will not be a factor. It is estimated that the life of evaporator tubes would be at least 2½ years, consequently the cost of repairs to equipment would not be abnormal under average operating conditions.

Status of Waste Sulphite Liquor Problem

As previously pointed out all of the work on waste sulphite liquor may be considered in the mill experimental stage. Before any methods can be proven sufficiently practicable to be universally adopted it will doubtless be necessary to spend large amounts to overcome any difficulties that may arise in developing an economical and practical method of utilizing waste sulphite liquor. The problem of concentrating the liquor by multiple effect evaporators has been successfully accomplished although it is expensive.

The use of the mechanical thermo-compressor may help to reduce the cost of evaporation although European practice indicates that at low pressures the upkeep cost will be considerable. Most of the thermo-compressor evaporators in Europe are working on relatively high pressures, approximately 30 lb. on caustic soda evaporation. A 5 or 6 stage compressor needed for sulphite evaporation at the lower pressures needed should show a relatively small cost for minor repairs and upkeep. Some work has been done in using the heat of the flue gas to concentrate the liquors and this may be the logical method to adopt if the concentrated liquor is burned in the furnace. In the last analysis the cost of preparation must be offset by the value of the material as fuel. Although this problem is an extremely complex one, the work done so far indicates promise of solution at some future date.

Stream Pollution Legislation

Many states have already passed laws regarding municipal and industrial stream pollution. The conditions in each state and in each locality may be entirely different so that it is practically impossible to formulate legislation that will cover all phases of stream pollution. However, the increasing use of the waters of the various states for fishing, camping and other recreational purposes has emphasized the need and value of reducing the pollution of streams and lakes. Progressive industrial concerns recognize this fact and are taking all possible measures to reduce pollution.

Recognizing that the solution of the pollution problem lies in cooperation rather than antagonism between governmental agencies and industries the Sanitary Water Board of Pennsylvania has adopted a broad comprehensive policy. W. L. Stevenson, chief engineer of the Department of Health, outlines in a paper recently delivered before the American Institute of Chemical Engineers, the broad fundamental resolution of the Board, as follows:

"WHEREAS, The degree of pollution of the waters of the State varies widely from the pristine purity of a small stream flowing through a virgin forest to the grossly polluted stream draining a valley given over to intense municipal and industrial development, and

WHEREAS, Such differences in condition and the present and probable future use of the streams must be recognized in determining the required degree of treatment of sewage and industrial wastes, and

WHEREAS, The natural powers of streams to inoffensively assimilate and dispose of polluting matters by dilution must be utilized so far as compatible with the general interests of the public in order to establish a practicable and economical program for stream control, therefore,

Resolved, That the waters of the State be classified as follows:

Relatively Clean and Pure Streams

CLASS A.

Streams in their natural state probably subject to chance contamination by human beings, but unpolluted or uncontaminated from any artificial source, hence generally fit for domestic water supply after chlotrination, will support fish life and may be safely used for recreational purposes.

Streams in Which Pollution Shall Be Controlled

CLASS B.

Streams more or less polluted, where the extent of regulation, control, or elimination of pollution will be determined by a consideration of (a) the present and probable future use and conditions of the stream; (b) the practicability of remedial measures for abatement of pollution, and (c) the general interests of the public through the protection of the public health, the health of animals, fish and aquatic life, and the use of the stream for recreational purposes.

CLASS C.

Streams now so polluted that they cannot be used as sources of public water supplies, will not support fish life, and are not used for recreational purposes and also from the standpoint of the public interests and practicability it is not now necessary, economical or advisable to attempt to restore them to a clean condition; and further,

Resolved, That all artificial pollution of Class A streams shall be prohibited, and any sewage or industrial wastes on the watershed shall be treated to such a degree that the effluent shall be practically free from suspended matter, non-putrescent and disinfected, and that recreational use shall not be sanctioned within prejudicial influence of water works' intakes; and further

Resolved, That the degree of treatment of sewage and industrial wastes discharged into Class B streams shall be determined for each particular stream or portion thereof after consideration of the general interests of the public and the economies of the particular case; and further

Resolved, That sewage and industrial wastes may be discharged into Class C streams; provided, however, that such discharge shall not create any public nuisance or menace to health."

State Laws

The principal features relating to pollution incorporated in the laws passed by various states are as follows:

1. CONNECTICUT.

A general law is designed to prevent any pollution of waters of the state by a municipality or private corporation that is prejudicial to the public health. The state department of health investigates any complaints and may issue orders to prevent the continuance of pollution.

2. DELAWARE.

The health laws apply to streams used by any town or city for drinking water.

3. INDIANA.

Laws prohibit any persons or firms to deposit acid, dye stuff, coal tar, oil, or any other refuse matter into any waters of the state in quantities sufficient to injure or destroy the lives of fish.

4. MAINE.

The regulations regarding stream pollution apply largely to the source of drinking water. The general laws covering industrial wastes do not apply to four of the large rivers of the state, viz., Penobscot, Kennebec, Androscoggin and Saco.

5. MARYLAND.

The laws provide that if any waters of the state are polluted by wastes from manufacturing or industrial establishments so that they are a nuisance to the public health or comfort, the State Board of Health shall require such establishments to cease pollution or make alterations in the methods of waste disposal. The State Board of Health has authority to approve of any alteration in waste disposal methods.

6. MASSACHUSETTS.

General laws are in effect regarding the pollution of waters used for drinking purposes. Special laws are in effect that prohibit the pollution of specific streams. Several of the large rivers in

the state do not have any restrictions regarding pollution but a majority of the streams are closely regulated as to industrial wastes.

7. MISSOURI.

The general laws apply to depositing offal or other filth materials into waters of the state. Industrial wastes are not covered and the Mississippi and Missouri rivers are excluded from any stream pollution laws.

8. NEW YORK.

The law regarding industrial wastes is as follows:

"It shall be unlawful to allow any dyestuffs, coal tar, sawdust, tan barks, live refuse from gas houses, or other deleterious or poisonous substances to be turned into or allowed to run into any of the waters of this State in quantities destructive to the life of or disturbing the habits of the fish inhabiting, the same, . . . "

9. NORTH CAROLINA.

The public health laws cover the pollution of waters used as a public water supply, and there are no definite regulations regarding industrial wastes.

10. OHIO.

The laws in regard to stream pollution are broad and upon formal complaint provide for the investigation of conditions that comprise a public nuisance due to the discharge of sewage or other wastes. The State Department of Health has broad powers and is authorized to bring about a correction of the conditions, if possible, before a final appeal is made to the state department.

11. PENNSYLVANIA.

The pollution of streams is regulated by authority of the Sanitary Water Board, which makes a survey of municipal or industrial pollution, and cooperates with the municipality or industry to correct the condition as quickly as possible. The public interest and the industry are both considered in the solution of any particular problem.

12. TEXAS.

The act preventing pollution applies principally to waters used for live stock drinking and domestic purposes.

13. VERMONT.

There are general laws regarding the pollution of streams used as a source of water or ice supply, but no specific regulations on the pollution of streams by industrial establishments.

14. WEST VIRGINIA.

The health laws apply principally to the pollution of streams used for drinking purposes and the disposal of industrial wastes that are a menace to public health.

15. WISCONSIN.

The specific law affecting paper mills (Section 29.29 (3) of the Statutes), is as follows:

Deleterious Substances. No person shall cast, deposit, or throw overboard from any boat, vessel, or other craft, into any waters within the jurisdiction of the state, or deposit or leave upon the ice thereof until it melts, any fish offal; or throw or deposit, or permit to be thrown or deposited, into any waters within the jurisdiction of the state, any lime, tan bark, ship ballast, stone, sand, slabs, decayed wood, sawdust, sawmill refuse, planing mill shavings, or any acids or chemicals or waste or refuge arising from the manufacture of any article of commerce, or any other substance deleterious to fish life other than authorized drainage and sewage from municipalities.

The State Board of Health is authorized to conduct a survey "To determine to what extent the natural waters are being polluted by industrial wastes, and in what way these wastes might be utilized. . . ."

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Enforcement of Laws

If some of the laws were strictly enforced it would result in closing down many industries and possibly destroying their productivity. The amount of pollution for which any particular paper mill is responsible has not yet been established. While it is admitted that all paper mills discharge certain impurities into the stream, the effect of such practice upon stream life has not been definitely determined. However, it has been found that certain wastes, such as sulphite liquor because of a high oxygen demand have a greater deleterious effect upon fish life.

Study the Problem

The action taken by the Ohio and Wisconsin State Boards of Health and the Sanitary Water Board of Pennsylvania indicates that these bodies have an adequate conception of the stream pollution problem and its direct influence on the industry. They advocate the fullest cooperation between the industry and the state departments in order to present a feasible solution of the stream pollution problem and at the same time not unduly disturb the industrial organizations using the various streams in the state. Moreover, they advocate research upon this problem in order to determine to what extent paper mills are responsible for stream pollution and how the mills can best cooperate with the state authorities for the further improvement of the streams.

Progress of Paper Mills in Regard to Stream Pollution

It has been definitely shown that the majority of pulp and paper mills are extremely interested in the problem of reclaiming paper making fibers and fillers and thus reducing the danger of stream pollution. This is demonstrated by the progress made during the past three or four years, and by the interest with which more mills are seeking information on the subject of stock reclaiming devices. There is hardly a paper mill in the industry that has not spent several thousand dollars on modern saveall equipment, and this means that the entire industry has spent hundreds of thousands of dollars in the study of this problem during the past three or four years. Whereas, it is true that some mills have obtained a good return on their investment if the proper type saveall has been selected, many plants have bought different makes of saveall before they have found the one suited to their particular conditions. This is one of the causes for the somewhat slow progress and it is only fair to the paper mills to give them sufficient time to try out the various types of equipment in order to enable them to select the proper devices without endangering their product.

Experiment Equipment Installed

A number of mills have been confronted with the problem of disposing of chemicals from the pulp making processes. Much expensive equipment has been installed to take care of this waste material, which is connected to a marketable byproduct. Due to the heavy installation and operating costs this reclamation is usually carried on either at a loss or with an extremely small margin of profit to the company.

Cooperation

The Committee on Waste of the Technical Association of the Paper Industry is willing and anxxious to cooperate with all the states and governmental agencies making a study of the disposal of pulp and paper mill wastes for the further improvement of all waters used by industry and the public. By such cooperative work it should be possible to solve the problem on a practical basis, with a reasonable degree of speed, and with fairness to both the industries and the public.

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A Modern Soda Pulp Mill

By E. P. Wood *

Much interest has been shown by soda pulp manufacturers in the new soda pulp mill of the Tonawanda Paper Co., Inc., North Tonawanda, N. Y. Owing to the new methods which are being used, especially in the recovery of soda since such excellent results are being obtained. Among the changes from old methods which are of special interest are the washing of pulp on Mount[1] continuous washers, the utilization of waste heat from the incinerators for cooking, the continuous causticizing plant with the elimination of leach cells as a special unit, and the complete combustion of the black ash waste in the lime kiln with the lime sludge.

Cooking

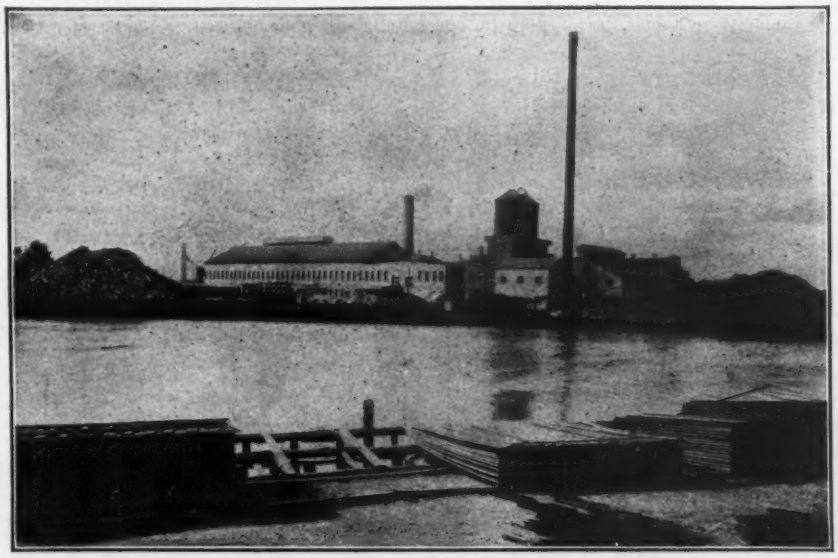
The Morterud[2] system of cooking is being used and is proving very satisfactory. A very uniform pulp is being made, there is no trouble from uncooked chips, and the percentage of screenings is very low. Cooking liquor at 90 per cent causticity contains from 4.5 to 5.0 pounds of caustic soda per cubic foot, and black liquor from the second wash on the continuous washers is used for making up the volume of the cooking liquor in the digesters. Cooking is done at 100 pounds pressure and the time required for each cook is from 4 to 5 hours.

The cooked stock is blown to the usual type blow tower into which black liquor is pumped during the blow for the double purpose of preventing a plug-up as well as being the first step in fixing the density of the stock for the washing process. The blow tank is directly under the tower and the pulp drops into it by gravity.

Continuous Pulp Washers

The washers, two in number, are large drums, 6 feet in diameter, 4 feet wide, covered with 60 mesh wire, revolving in circular filter troughs, concentric with the filter drum, through which the unwashed stock flows. The vats are equipped with overflows and also black liquor spray pipes for regulating the consistency of the stock. The drums are equipped with automatic valves and the washing is carried on in three stages. The speed of the washers is 2 r.p.m. Fifteen inches of vacuum is carried on the main vacuum line, but there are regulating valves for vacuum lines on each stage.

Stock to be washed is pumped from the blow tanks to an overhead flow box where the consistency is finally regulated before it goes to the washers. The first stage of washing is when the pulp cake is formed on the wire, beginning when the drum first moves in the stock vat and finishes just after it leaves it, Vacuum is on this section from 8 to 9 seconds, and during this time the original cooking liquor together with the strong liquor used for regulating the density of the stock is drawn off. The drum then moves the stock to the second stage during which time weak black liquor is sprayed on the cake. The filtrate from the first and second stage is collected in a trap on the vacuum line and pumped to the black liquor storage for the evaporators. The density of this liquor averages from 9 to 10 deg. Bé. During the third stage of washing, hot water is sprayed on the cake, and this filtrate is used over as weak liquor for the first wash.



TONAWANDA PAPER CO., INC.

Each washer has a doctor for removing the pulp cake after washing and the stock falls into a trough where it is flushed to the brown stock chest with water. The consistency of the pulp going to the washers is from 1.5 to 2.0 per cent, and that of the pulp cake leaving the washers is 15 per cent. Analysis of the stock leaving the washers shows that the total alkali content figured as soda ash is 7.48 pounds per ton of pulp. Dilution of the liquor in washing is on an average around 2 deg. Bé.

Bleachers

White water from the subsequent thickening operation is added to the pulp in the brown stock chest, the pulp is screened on flat screens, concentrated on Oliver[3] continuous filters and bleached in the Fletcher type of Wolf[4] bleachers. The density of the stock in the bleachers is 14 per cent. After bleaching, it is washed

* Asso. mem. TAPPI; Chem. Eng., Tonawanda Paper Co., Inc., No. Tonawanda, N. Y.
[1] Glamorgan Pipe and Foundry Co., Lynchburg, Va.
[2] Fibre Making Processes, Chicago, Ill.
[3] Oliver Continuous Filter Co., San Francisco, Calif.
[4] Pulp Bleaching Corp., New York.
[5] Swenson Evaporator Co., Harvey, Ill.

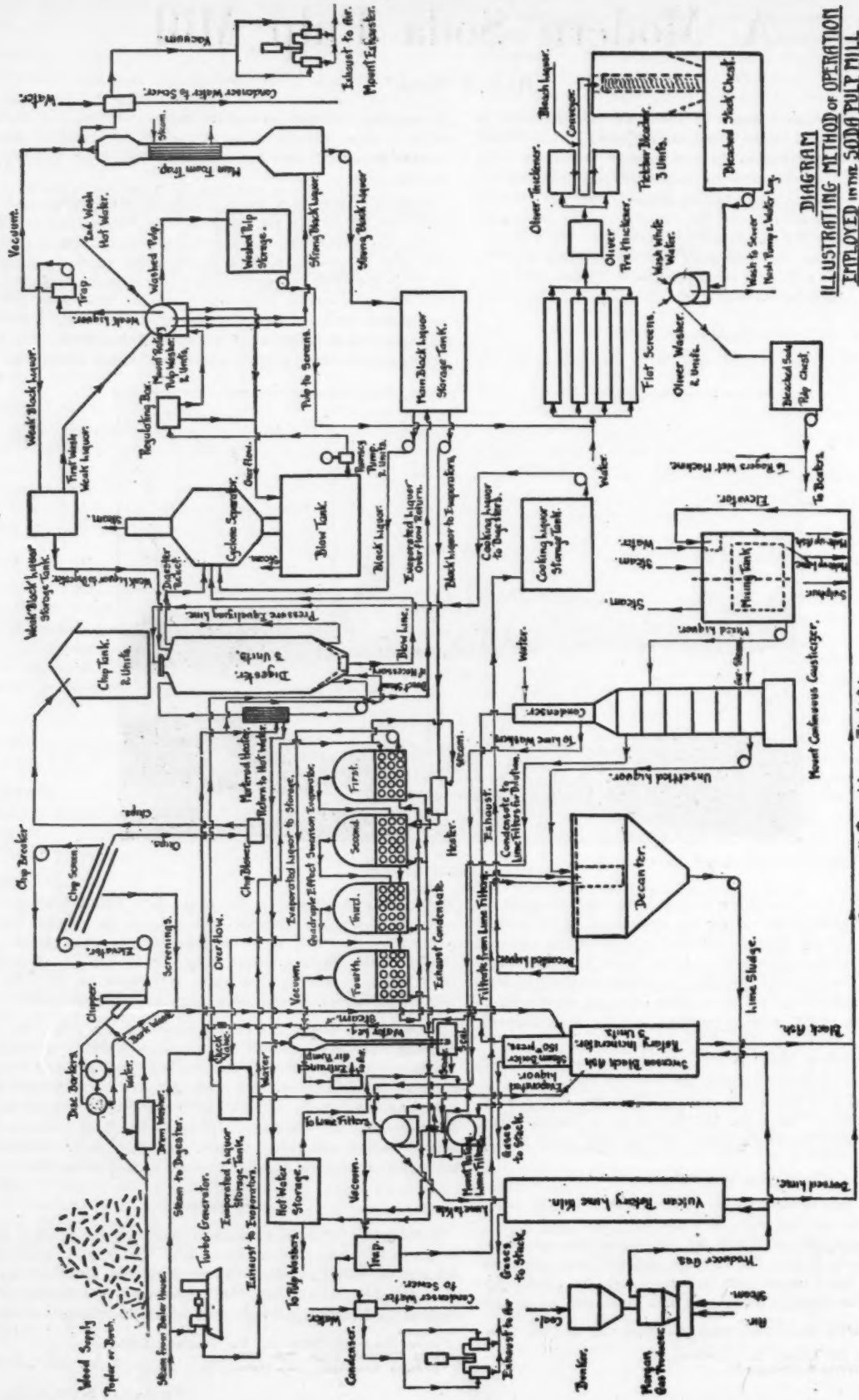


CHART SHOWING FLOW OF MATERIALS

on Oliver filters, and from these washed to the beater chests. Pulp is being bleached with from 8 to 10 per cent of bleaching powder (35% Cl.)

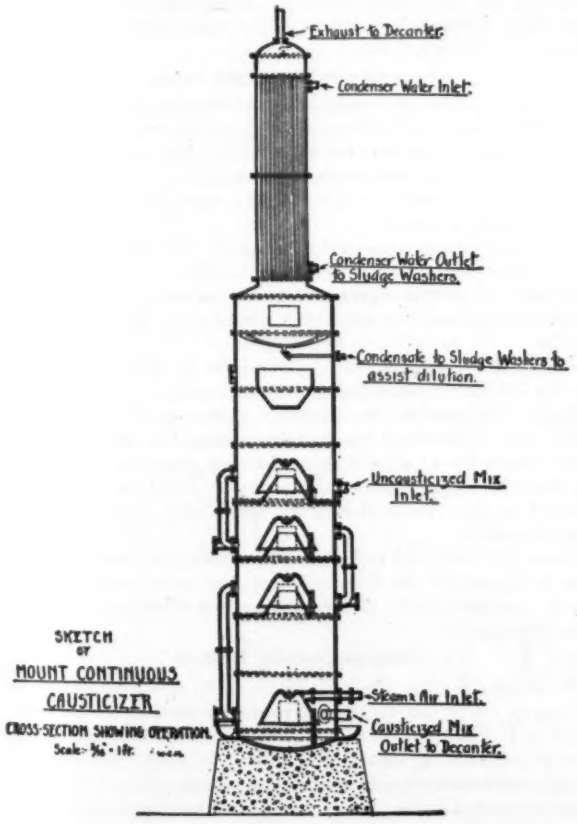
Evaporators and Incinerators

The strongest black liquor from the washers which averages 9.5 deg. Be. at 60 deg. F. is pumped through a heater into the second effect of the quadruple effect Swenson evaporators. The heavy black liquor at 36 deg. Be. at 60 deg. F. is pumped from the first effect to an overhead storage tank for the incinerators. The flow to the incinerators is by gravity.

The incinerators are gas fired and each one is equipped with a high pressure 135 hp. boiler for the recovery of waste heat. The steam from these boilers is piped back to the main steam line to the digesters, so in this manner the incinerators supply a portion of the steam required for cooking. The exact amount of heat recovered is not known at present as measuring instruments have not as yet been installed. The one gas producer supplies both the incinerators and the lime kiln. The discharge ends of the incinerators and the lime kiln are in line and a drag chain conveyor removes the fresh burned ash and lime. The black ash contains 20 per cent carbon.

Liquor Making Room

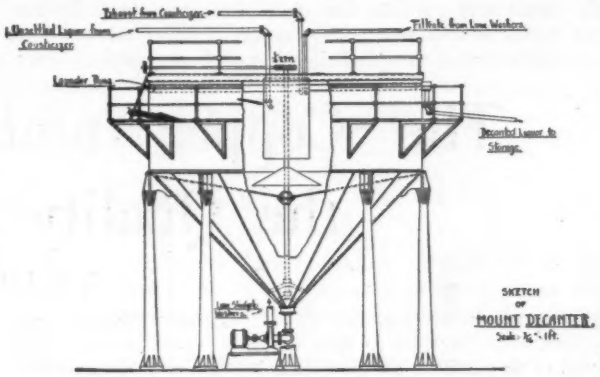
The equipment in the liquor making room is not of new design.


Exhaust to Decanter
Condenser Water Inlet
Condenser Water Outlet to Sludge Washers.
Condensate to Sludge Washers to assist dilution.
Uncausticized Mix Inlet
Steam for Inlet.
Causticized Mix Outlet to Decanter.
SKETCH OF MOUNT CONTINUOUS CAUSTICIZER
CROSS-SECTION SHOWING OPERATION.

We will find it in other mills, but some of the old standard equipment, such as leach cells, has been done away with as a special unit, and leaching is now carried on along with causticizing. This, of course, brings all of the black ash waste into the liquor which must eventually be clear, and a new problem of the settling out of this carbon had to be taken care of. The question of the disposal of black ash waste has been given due consideration. By taking the step of leaching and causticizing in the same tanks, the waste carbon is settled with the lime sludge, passes to the kiln with it, and is burned. Soda which was present is discharged from the kiln with the burned lime.

Slaking Tanks

The mixture of lime and black ash from the kiln and incinerators is conveyed to the two slaking tanks and charged into them continuously. These tanks are nothing more than the old caus-



ticizing tanks with lime baskets and agitators. There are steam connections for heating the contents of the tanks and a temperature of 150 deg. F. is maintained. Water is added to keep up the volume of liquor in the tanks. The flow of liquor, lime and ash from the tanks is continuous, being regulated to keep the strength of the liquor as uniform as possible. Fresh lime or soda ash when required can be added in these tanks, and it is the present practice to use all black ash as it is burned, regulating the amount of lime so that just enough is added for causticizing the carbonate that is going in. The causticity of the mixture pumped out is around 50 per cent.

Continuous Causticizer

The continuous causticizer is a vertical tower built up of seven cast iron sections. Steam admitted at the bottom passes up and through a series of mushroom baffles. The solution from the slaking tanks is pumped into the causticizer about a third of the way from the top, flowing down from one section to another through overflow pipes, coming in contact with steam at each mushroom. The temperature of the solution is increased to 212 deg. F. A condenser at the top condenses any vapors which would pass off, the condensate is collected and used for lime washing on the lime filters. Exhaust steam from 5 to 7 pounds pressure is sufficient for the heating and keeps the solution well agitated. The causticity of the solution is brought up to 88 per cent in the causticizer.

Decanter

The next step in the operation is the settling of the liquor and this is accomplished in a decanter, a conical shaped tank. The liquor and sludge containing black ash waste are pumped into this, the sludge and carbon settle to the bottom from where it is pumped to the lime washers, while the clear caustic liquor rises to the top, flows over a launder to the storage tank. The temperature of the liquor in the decanter is about 150 deg. F. Causticity increase is 2 per cent.

Lime Washers

From the bottom of the decanter, lime sludge is pumped to the lime washers. This sludge contains 25 per cent solids, and of the solids, black ash waste is 10 per cent of the total. Fifteen inches of vacuum is carried on the two machines which are arranged in series. The cake formed on the first washer is sprayed with hot water from the hot well or condensate from the top of

the causticizer. A doctor removes the cake from the first washer, it falls into a trough where it is agitated and mixed with hot water, and flushed to the second washer. Again the cake is washed and this time cut off by a doctor into a chute from which it is carried into the kiln by a worm conveyor. The wash liquor drawn off in each wash is pumped from a trap in the vacuum line to the decanter.

The lime cake going to the kiln is 35 to 40 per cent dry and free alkali in it is 0.5 per cent figured as soda ash. Analysis of the burned lime from the kiln shows free alkali to be 2.5 per cent figured as soda ash.

Taking a general survey of the whole mill, one notices at once the compactness of the installation, although in the arrangement of each department, ample allowances have been made for expansion. As for the results that are being obtained especially in soda recovery, figures for the first month of operation (August 1925) show that the plant is giving satisfaction. The soda recovery the first month was over 80 per cent and there has been a gradual increase to the present time, with 92 per cent for December and 93 per cent for January. Lime consumption has also been low, for in December it was 125 pounds per ton of pulp and in January 125 pounds.

There is no doubt but that the new operation of the liquor room accounts for the gain.

The "Copper Number" an Exponent of the Quality of Cellulose

By M. L. Griffin *

Comparatively speaking, there are few substances more intricate in composition, complex in constitution, or varied in their reactivity, or about which it is more difficult to arrive at definite tangible conclusions than with cellulose. This is partly due to the fact that what we call "cellulose" is not the distinct name of a definitely characterized chemical individual, but rather a collective name of closely inter-related series of allied members, which often by imperceptible gradations, merge one into another.

Their ready susceptibility to oxidation and reduction, hydrolysis and dehydration, condensation and depolymerization, either before, during or after alkalation or acidilation, thus giving rise to an indeterminate number of products, often similar in appearance, analogous in properties, yet differing from the original cellulose, only complicates the subject. Pure cellulose, or "normal" cellulose, as Cross and Bevan have distinguished it, is very inert and resistant to alteration as we all well know. Its usefulness in the world of humanity is referable to its predominating negative characteristics.

Acid and Basic Characteristics

Cellulose shows both acid and basic characteristics, dependent upon the proximity of OH groups to CO and CH_3 groups respectively in the molecule. This has been proven by the determination of the absorption of both acids and alkalies, showing the properties of a feeble acid and a yet feebler base, both of which play very important parts in many industrial processes involving cellulose, as paper and textiles.

In the bleaching of textiles, both acid and alkaline treatments are resorted to under safe conditions to selectively remove impurities. In the reduction of wood to pulp by chemical processes, similar reactions take place and where compatible, it is possible to combine the functions of acid and alkali and deoxidation in one process.

This may be accomplished by the overlapping of the sulphite and soda processes, as is now being done to a very limited extent. It is here that recognition of the part played by the "base" enters. I believe that careful studies of this problem by chemists in the pulp industry will meet with large rewards.

All plant tissues are comprised of cells, and the envelope of these cells is composed of cellulose. Cotton is taken as the typical cellulose. The natural impurities of cotton do not exceed 4 to 5 per cent, composed of a protective film of waxy, oily matter on the surface with a trace of pigment, and mineral and protein matter within the cell cavity or canal; yet to remove these, discriminating and painstaking processes must be resorted to.

Celluloses of Plant World

In the higher forms of plant life, the individual cells coalesce in such a manner that their walls are broken up with the formation of tubular structures. These are known as compound celluloses, comprising a wide range of tissue constituents of three different general characteristics; those of a mucilaginous colloidal character, those in which the fatty, waxy bodies are associated with the cellulose and called adipocellulose, and lastly the woody forming substances designed as lignocelluloses.

According to Cross and Bevan

From their chemical constitution we may regard the celluloses of the plant world as follows, according to Cross and Bevan.

(a) Those of maximum resistance to hydrolytic action, and containing no directly active CO groups.

(b) Those of lesser resistance to hydrolytic action and containing active groups.

(c) Those of low resistance to hydrolysis, with formation of carbohydrates of low molecular weight.

Group (a) is best represented by cotton which exhibits many negative characteristics and a low reactivity of the CO and OH groups.

Group (b) is characterized by a greater proportion of oxygen in the ultimate composition and by the presence of active CO groups. The general characteristics of the group are those of oxycelluloses. These are very widely distributed in the plant world and compose the woods and lignified tissues generally. They form the basis for various industrial processes in which the cellulose is isolated by direct conversion of the non-cellulose constituents into soluble products.

Group (c) is defined to include those substances closely resembling in appearance the true celluloses, but easily resolvable into simple carbohydrates by the hydrolytic action of enzymes, or dilute acids and alkalies.

Cellulose Complex Defined

To summarize—the cellulose complex in its widest sense may be defined as comprising all the polysaccharide carbohydrates, which form an essential portion of the structure of the plant and which yield cupric reducing sugars on hydrolysis by acids. The cellulose complex comprises superior and inferior members, some of which become detached in the process of isolation and purification.

Cellulose Defined

With these circumstances in view, cellulose may be defined to be the resultant residue from a series of carefully regulated processes of attrition by methods of selective extraction, oxidation and hydrolysis, sufficient to effect the complete removal, in the mildest possible manner, of the other constitutional complexes, together with all adventitious and extractive matter.

Thus then it becomes apparent that the preparation of pure cel-

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lulose, from its raw material sources, whether it be from cotton in its present natural form, from various woods possessing marked individual characteristics, bast fibers and straws, becomes an exceedingly complex problem. If the product is to enter the textile industry, it is costly, and any degradation of quality results in a commensurate loss. Therefore, though the impurities to be removed from textile fibers by bleaching processes are small, they are very significant.

Risk of Carrying Process Too Far

If a product, textile or paper, is desired which will have reasonable permanence, the associated impurities and allied substances must be carefully removed with some risk of carrying the process too far, entailing faults and consequent losses. These are not always apparent, especially in producing paper pulps, and adequate control has never been established. Cellulose thus modified or degraded by over treatment with oxidizing and hydrolyzing agents, acquires cupric reducing properties. The determination of the "copper number" is the most definite measure for diagnosing the chemical condition of cellulose in numerical terms yet available. To one who has had considerable experience in taking the copper number of products in process it is possible to form a good judgment of the progressive treatment such products have undergone.

Conditions That Should Be Fulfilled

Fehling's solution, applied under various specifications, has been known and used for many years for the determination of reducing sugars, but it is only reliable in the hands of experienced chemists and the process is rather tedious. Recently Clibbens and Gaeke (J.T.I. 1924, T27-38 and J.S.C.I. 1924, 126) have disclosed methods for the "Determination of Copper Number of Cellulose" and state that a satisfactory method should fulfill the following conditions:

A blank test should give a result not far from zero.

Pure cellulose should yield only a minimum figure.

Slightly modified cellulose should give values markedly different from pure cellulose.

Results should be reproducible.

Method should be easily carried out.

The authors state that "In all methods involving the use of Fehling's solution, it was found that very strict attention to detail was essential if truly comparable results were to be obtained," and it was therefore decided to examine the methods of Braidy (Rev. Gen.Mat.Col. 1921, p. 35) and of Koehler and of Marqueyrol (Mem.—Poudres, 1921, p. 73), in which Fehling's solution is replaced by a solution of copper sulphate made alkaline by the addition of a mixture of sodium carbonate and bicarbonate.

Procedure in Braidy's Method

The procedure in Braidy's method is as follows:

Two solutions are required:

(a) Pure copper sulphate	—	100 grams
Water	—	1 liter
(b) Sodium bicarbonate	—	50 grams
Crystallized sodium carbonate	—	350 grams
Water	—	1 liter

Immediately before using, 5cc. of solution (a) are run from a burette into 95 cc. of solution (b); the mixture is raised to boiling temperature and poured over about 2.5 grams of the material to be examined, contained in a conical flask of a capacity very slightly greater than 100 cc. The material is well wet out and any air bubbles allowed to escape, when the flask is closed with a glass bulb and immersed in a boiling water bath for three hours. It is then removed and its contents filtered with suction.

The material impregnated with cuprous oxide is washed first with dilute sodium carbonate solution and then with hot water.

The cuprous oxide is dissolved by treating the material on the filter with the following solution:

Iron alum	—100 grams
Sulphuric acid conc.	—140 cc.
Water	—1 liter

Two portions of this solution of about 15 cc. and 10 cc., are usually sufficient for the purpose, though a further treatment with 10 cc. may occasionally be necessary in the case of highly reducing products. The material is then washed with dilute sulphuric acid and the combined filtrates and washings are titrated with N/25 potassium permanganate whose value per 1 cc. is equivalent to 0.00256 metallic copper.

Advantages of Braidy's Method

Braidy's method possesses many advantages when compared with those in which Fehling's solution is used, but it is well to observe the prescribed details of the procedure.

In place of the conical flash referred to I have used the pressure flash which is provided with an air-tight closing cap, and found it very satisfactory.

I have made many determinations of the copper number of cotton fabrics in process and others, faulty to dyeing, and have found the method very simple and satisfactory. For detecting and measuring oxycellulose in bleached cotton fabrics it is far more reliable and satisfactory than tests made with basic dyes.

Research Recommended to Association

I have not been able to do much towards applying this test to paper pulps, but believe it is capable of furnishing much control information on their quality, which is now lacking, and I recommend applied research to determine the value of the "copper number" by Braidy's method, to the chemists of the Association.

The "copper number" is the weight in grams of metallic copper obtained per 100 grams of dry material and is an index of the reducing properties of the material under test.

Report of Drying Committee

By W. N. Baker, Chairman

Although we do not feel that there has been any waning of interest in the paper drying problem, there have been no new paper machine drying tests submitted to the committee this year.

A number of mills have been working on methods for the control of air conditions in their machine rooms and in this respect the condition strived for is pretty well recognized, the problem being indinarily one of adoption of local conditions to accomplish the desired results.

At our Fall Meeting, as a preliminary to a discussion of the problem of supplying steam to the dryers and removing the condensate, we gave our members an opportunity to become familiar with the principles of a number of the representative drying systems now on the market, but unfortunately owing to lack of time the discussion was necessarily postponed until the meeting in New York. We are hoping that at this meeting we shall hear brought out the salient principles of this problem upon which there have been so many diverging views and which after all should not, from a strictly engineering viewpoint, be so complicated.

Thermodynamic Comparison of Paper Drying Methods

By Ogden Minton *

Much of the following will be found to be very elementary but the writer has found so many concerned with this subject who have no clear understanding of the elementary facts that he feels not unwarranted, even at the risk of repetition, in bringing out the elemental yet basic facts met with in drying paper, which after all is simply evaporating water. Everyone has at sometime or other hung up a piece of wet cloth to dry, yet how many of those can explain the phenomena that occurs in the process of drying?

Much of the misunderstanding that has occurred in the study of drying paper is because of a false notion that air has a certain *capacity* for moisture. This false notion is being perpetuated by such expressions as "saturated air." "A cubic foot of air contains so many grains of water," etc. This should not be said. An accurate statement would be "saturated vapor" and, "a cubic foot of *space* contains so many grains of water." Not a cubic foot of *air* but a cubic foot of *space*. The cubic foot of *space* will hold a certain fixed amount of water (in the form of vapor) at a certain temperature regardless of the fact that air may or may not be present. *Air* does not absorb water—*space* does.

A Law of Thermodynamics

One of the fundamental laws of thermodynamics thoroughly covers this point. It would be well for all those interested in any drying problem to carefully study this law. It has been well stated by C. F. Hirschfeld in his "Engineering Thermodynamics" and is as follows:

"Vaporization from the surface of a liquid above which is the gas of another substance does not take place under the pressure of that gas, but under the pressure of any vapor of the evaporating liquid which may be present and be mixed with the gas. Thus water in a vessel open at the top will evaporate or vaporize in the same way and with the same absorption of heat and in the same quantity if it be exposed to still air or other similar gas, or be exposed to a space devoid of air or other gas. The pressure under which evaporation takes place is that of the water vapor in the space above the liquid, and if there happens to be air in the space the phenomenon of evaporation is not altered. For very exact physical work this statement must be modified to take account of certain variations introduced by very minute molecular attraction between different gases and vapors, but for the most exact engineering work the law may be stated: *Evaporation from the surface of a liquid in contact with a gas or gases with which the liquid or its vapor does not react chemically is independent of the presence of that gas.*

"Since the evaporation of the liquid takes place under the pressure of that liquid, the latent heat of vaporization and similar quantities must correspond to that pressure. Such heat values can easily be found for any case when a vapor table for that particular substance is at hand, because, although it is generally difficult to measure the vapor pressures, they must correspond to the temperature of the space above the liquid. The vapor in that particular space must be saturated, because if superheated it would lose heat to the liquid as previously described. If saturated, its pressure must correspond to its temperature, and knowing the latter the former can be found from the vapor tables. Thus, water with its surface exposed to air at a temperature of t° F. will evaporate until the space above it contains as much water as it is capable of holding at that temperature; that is until the volume occupied by unit weight of the vapor corresponds to the value given in the vapor tables. The water vapor must have the same temperature as the air with which it is mixed, and must have the pressure corresponding to that temperature and also contain all heat in quantities corresponding to that temperature. To find the heat necessary to cause evaporation of one pound under such conditions, the temperature of the space above the liquid must be found in the steam tables. The corresponding heat of vaporization will be the value sought."

To appreciate fully the foregoing we must be perfectly clear as to the meaning of the term "vapor pressure." A clear definition and description of this term is given in "Theoretical and Physical Chemistry" by Bigelow:

"When we have a liquid (or a solid) in a closed vessel, a portion of it becomes vapor and, as such exerts a pressure like all gases. This gaseous pressure reaches a maximum for a definite temperature. *We may consider vapor pressure as the measure of the tendency of a substance to become a gas.*"

Therefore, we define vapor pressure of water as the measure of the tendency of water to become a vapor.

To illustrate this assume a barometric tube inverted over a trough of mercury. By means of a pipette with a curved end a small quantity of water may be inserted into the bottom of the tube. When this is done the mercury will fall and some but not all of the water will evaporate. The fall of mercury is a direct measure of the gaseous pressure produced by the vapor in the space which originally was a vacuum. If the temperature of this vapor is raised by means of a heated liquid being passed through a jacket around the tube the mercury will fall farther, that is, *the vapor pressure increases with the temperature.* If we increase the temperature of the vapor sufficiently the mercury in the tube will go down to the same level as the mercury in the trough outside. At this temperature the tendency of the substance to become a vapor just balances the pressure of the atmosphere and it is then at its boiling point.

While evaporation takes place from the surface of water heated in an open vessel the atmospheric pressure holds it down, as it were, to its proper volume. However, when the vapor pressure reaches a value equal to this pressure upon it, bubbles of water vapor form within the body of the water. We then have ebullition, or in other words the water is boiling. It is evident that if the tendency to become a vapor (vapor pressure) is less than the pressure upon the surface of the liquid bubbles of vapor cannot form in the interior, the boiling point has not been reached. It is, of course, clear that water can have an infinite number of different boiling points, each corresponding to a different external pressure. It should be clear to the reader from the foregoing that evaporation and boiling are very similar. Evaporation takes place from the surface of water while boiling occurs when vapor forms within the body of water.

It was stated before that when water was inserted in the barometric tube the mercury dropped to a new level and that some but not all of the water evaporated. If still more water were added the level of mercury would not change except as it would fall due to the actual weight of this additional water, which shows that *vapor pressure is independent of the quantity of liquid present.*

From all the above the following facts can be drawn and should be carefully borne in mind.

1. Evaporation takes place from the surface of water and the vapor pressure does not equal the atmospheric or external pressure.
2. *Boiling* occurs in the body of water when the vapor pressure of the water equals the atmospheric or external pressure.
3. All saturated vapor at a given temperature has a definite vapor pressure, and knowing the former we can find the latter.
4. Vapor pressure is independent of the quantity of liquid present.

From experiments with barometric tubes in which water has been inserted and accurate temperatures of the vapor taken we can lay out a curve. This we call the vapor pressure curve for water.

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Similar curves, of course, could be made for other substances such as alcohol, ether, etc.

Evaporating Temperature

Any problem of paper drying is in reality a problem in water evaporation. In the standard paper machine drier heat is supplied by steam inside of the drier causing the shell of the drier to come to some definite temperature depending on the sheet of water and paper and the speed of this sheet. The rate of heat transfer from the shell of the drier to the sheet of water and paper will be controlled by the difference in temperature of the drier shell and the temperature of the sheet of water and paper. But the temperature of the sheet of water and paper is the same as its temperature of evaporation from which we can determine its vapor pressure. The law of thermodynamics states that while it is difficult to measure this vapor pressure, it is not so difficult to measure the temperature of the space just above the sheet of water and paper and knowing this temperature we can then find, from the steam tables, the vapor pressure and all other facts regarding the evaporation of the water. If this water vapor is not removed its vapor pressure will rise and its temperature will reach the boiling point which for water at atmospheric pressure is 212° F. Unless we have greater than atmospheric pressure we obviously can not further increase this temperature. We can increase the rate of drying, however, by increasing the temperature of the drier shell.

Effect of Vapor Removal

However, in drying paper on a standard paper machine we have found that we do not reach this temperature and the reason we know is that we remove the water vapor. When we remove this water vapor additional vapor forms which in turn is again removed. When the evaporation is thus hastened a large number of B.t.u. must be given up by the sheet of water and paper to furnish the necessary latent heat to cause evaporation. In giving up these B.t.u. the sheet of water and paper must lose temperature and thus the vapor pressure of this water is lowered and we have a lower temperature of evaporation. Also because of this the temperature of the drier shell must fall, but this fall of temperature is less because of the fact that the cast iron shell of the drier conducts heat in direct proportion to its inside and outside temperatures. We have assumed that this drier is kept full of steam at a constant temperature and, therefore, if we lower the outside temperature of the drier we immediately get an increased flow of B.t.u. to the sheet of water and paper to furnish the additional B.t.u. needed for the increased rate of evaporation.

The manner of removing this water vapor has in the past been done by passing air through the drier section which mechanically takes away the water vapor. Note here that the air does not absorb the water vapor. That as explained heretofore would be an incorrect statement. In mechanically taking the water vapor away the air distributes it throughout more cubic feet of space and while the temperature of this water vapor may drop it now has so much additional space that the pressure, due to the vapor, changes, and the water vapor may still remain vapor and not condense to water. If, however, this water vapor is not given enough space it will condense as all paper makers know only too well. It has been shown that the function of the air is merely a *mechanical* means of getting rid of the water vapor.

Case 1—Standard Paper Drier

In actual practice from tests and measurements we know that, for example, the temperature of evaporation at a given point and at a given time on a certain paper machine drier section (it varies throughout the drier section) is 182.86° F. (This exact temperature is selected with the desire to avoid interpolations in steam table readings later on). This temperature of 182.86° F. is the temperature of the vapor leaving the sheet of water and paper. It must be saturated because if it were superheated it would lose heat to the water in the paper. If saturated its pressure must correspond to its temperature, which from the steam tables we find to be a vacuum of 13.63 inches of mercury. In other words, evaporation was taking place just as though the paper were being dried in a vacuum drier at a vacuum of 13.62 inches of mercury. Now the air entering the drier section at this same point has been found to be 82° F. This air actually chills the water vapor and would cause condensation to take place except for the fact that it mechanically distributes this water vapor, as stated above, throughout many additional cubic feet of space. While the water vapor has a reduced temperature it also has a reduced vapor pressure due to the vapor expanding so that condensation does not take place. In the meantime the air has increased in temperature to, say 120° F. Part of this rise in temperature of the air was caused by heat given up from the water vapor and part also directly from the drier shell itself and to make matters worse this incoming air brings along some moisture of its own.

It was stated previously that the evaporating temperature was 182.86° F. Stated in another way this means that the temperature of the sheet of water and paper was 182.86° F. and evaporation was taking place at this temperature. It was also stated above that the vapor leaving the sheet of water and paper was saturated. This means that right at the surface of the sheet of water and paper this vapor was saturated. Where this vapor is mechanically distributed throughout more cubic feet of space it may be either wet, saturated, or superheated, depending on the number of cubic feet of space it is then occupying and also its new temperature. Thus it will be seen that a very large amount of air has been heated up and blown out of the roof of the machine room together with all the heat in the water vapor, all for the purpose of mechanically removing the water vapor. The low thermal efficiency of a standard paper machine drier is directly and entirely attributable to this heating of air..

Case 2—Fully Enclosed Paper Drier

In order to illustrate more fully the law of thermodynamics covering the drying of paper, let us take a second illustration. Assume a drier section of a paper machine entirely closed so that air cannot enter but with an opening so that atmospheric pressure will always exist around the driers, and so made that the vapor evaporated from the sheet of water and paper can readily get out without building up any appreciable pressure. Assume also a steam pressure in the driers themselves sufficient to cause evaporation. Now when the sheet of water and paper passes over the driers the water starts to evaporate, but there is no means so far available to take this water vapor away and the *space* surrounding the driers becomes saturated and the temperature rises till the water and vapor reach a temperature of 212° F., the boiling point of water, above which at atmospheric pressure it obviously cannot go. What would actually take place in this case would be that a slight pressure would be built up by the ebullition of the water caused by boiling. This would exert a force to push the vapor surrounding the driers out through the opening. Of course, when we measure the temperature of this vapor we will find it to be 212° F. It must be saturated because if superheated it would lose heat to the water in the paper. If saturated its pressure must also correspond to its temperature which from the steam tables we know must be atmospheric pressure. If the opening were closed steam pressure would result and the drier could be considered a sort of boiler plant. If, however, this opening were connected to a condenser we have a third condition which is illustrated by the vacuum drier.

Case 3—Vacuum Paper Drier

In the vacuum paper machine drier no air is admitted. The drier section is enclosed in an air-tight chamber and the paper is led in and out through a sealing device. Here again, unless some means were supplied to remove the water vapor the temperature

would go to the boiling point, namely 212° F., at atmospheric pressure. However, a condenser is connected to the vacuum drier section and the vapor is condensed by means of cold water as fast as it forms. A dry vacuum pump is attached to remove the air from the vacuum chamber. This pump has to be only of sufficient size to take care of air leakage, which practice has shown to be small, and to remove entrained air carried into the vacuum chamber in the sheet of water and paper. This again is a relatively small amount. By means of the condenser and vacuum pump a high vacuum (28 inches mercury) is maintained. Here we have a different condition of affairs. At 28 inches vacuum the boiling point of water is 100° F. and the driers are supplied with steam at, say, 5.3 lb. gage pressure giving the steam (we are assuming this steam to be saturated) a temperature of 228° F. Thus we have a very large temperature difference (128° F.) between the shell of the drier and the evaporating point of the water in the paper. The temperature of this water can never exceed 100° F. as that is the boiling point at 28 inches vacuum. The water actually does reach this temperature and the evaporation becomes very rapid. Theoretically, the water vapor leaving the sheet of paper is at this same temperature, namely, 100° F. and is a saturated vapor at 28 inches vacuum. Actually it is slightly superheated due to the fact that the ends of the driers and the exposed surface of the drier, not covered by paper, gives some additional heat to the vapor soon after it leaves the paper. However, this superheat is partly used up in returning heat to the water in the paper, as this paper is directly exposed to this vapor in passing from drier to drier. Actual readings taken with accurate thermometers and mercury columns to measure the amount of vacuum, which were then corrected for temperature and barometric pressure show only a fraction of a degree F. of superheat in the vapor going to the condenser. As mentioned above the rate of evaporation is very high and tests show an evaporation twice as great as on standard paper machine driers. This means that a vacuum paper machine drier of equal capacity will be only one-half as long and contain only one-half the number of driers compared to standard paper machine driers and the drying temperature is only 100° F. There is no air heated up and the water vapor is all caught and condensed in the condenser in the form of 100° F. water for whatever use the paper maker may have for it. The thermal efficiency is necessarily very high.

The law of thermodynamics covers all three cases.

First Case Discussed

In figuring out the thermal efficiency of a paper machine drier it has been customary to find the theoretical amount of heat necessary to evaporate the water in the paper and then compare this amount against the heat actually used. The theoretical amount of heat, however, is a very vague item and varies. Let us examine the three different cases cited and assume in each case that the sheet of water and paper coming to the drier is of the same degree of wetness, say, 70% water and 30% bone dry paper stock and that it has a temperature of 65° F. Also let us assume it leaves the drier at 8% water and 92% bone dry paper stock. Let us assume also that in the first case the evaporating temperature taken as 182.66° F. was an average evaporating temperature throughout the entire drier section and similarly in the second case that 212° F. was the average evaporating temperature and likewise that 100° F. was the average for the third case. By manipulating the drier sections in each case such a condition could be closely approximated.

The entering sheet of water and paper contains 30% of bone dry paper stock and 70% of water and is at a temperature of 65° F. Leaving the drier this sheet contains 92% bone dry paper stock and 8% water, and is at the same temperature at which evaporation has taken place. This amount of bone dry paper stock contained in the entering sheet of water and paper (30%) is 92% of total sheet of water and paper leaving the drier. Hence the total per cent of the original sheet of water and paper leaving the drier is $\frac{30}{92} = 32.608\%$ and is made up of the original 30% bone dry paper stock and the rest water. Therefore, 32.608—30=2.608% of original sheet of water and paper and is the amount of water left in the dry sheet. The original sheet of water and paper contained 70% water, so that 70—2.608 = 67.392% which is the amount of water to be evaporated. The total amount of water and paper in the entering sheet must be raised in temperature to the evaporating temperature. Therefore, to evaporate 1 lb. of water we must add sensible heat to $\frac{70}{67.392}$ or 1.0387 lb. of water, and sensible heat to the paper stock in this amount of water. Since there are 30 lb. of paper stock to every 70 lb. of water, we must add the sensible heat to raise $\frac{30}{70}$ x 1.0387 or 0.44515 lb. of paper stock to the required temperature. To this must be added the latent heat to evaporate 1 pound of water at this temperature.

CASE 1

Average evaporating temperature	182.86°F.	
Temperature of sheet of water and paper	65.00	
Difference	117.86°F.	
or B.t.u. sensible heat to raise 1.0387 lb. of water from 65°F. to 182.86°F. = 1.0387 × 117.86 =		122.42 B.t.u.
B.t.u. latent heat to evaporate 1 lb. of water at 182.86°F. =		988.2 B.t.u.
B.t.u. sensible heat to raise 0.44515 lb. paper stock from 65°F. to 182.86°F. = 0.44515 × 117.86 × 0.55 =		28.85
(0.55 being specific heat of paper) or a total of necessary to evaporate 1 lb. of water.		1139.47 B.t.u.

CASE 2

Average evaporating temperature	212°F.	
Temperature of entering sheet of water and paper	65	
Difference	147°F.	
Sensible heat to raise temperature of water 1.0387 × 147 =		152.69 B.t.u.
Latent heat to evaporate 1 lb. of water at 212°F. =		970.4
Sensible heat to raise temperature of paper stock 0.44515 × 147 × 0.55 =		35.99
Or a total of necessary to evaporate 1 lb. of water		1159.08 B.t.u.

CASE 3

Average evaporating temperature	100°F.	
Temperature of entering sheet of water and paper	65	
Difference	35°F.	
Sensible heat to raise the temp. of water 1.0387 × 35 =		36.35°F.
Latent heat to evaporate 1 lb. water at 100°F. =		1035.60
Sensible heat to raise temp. of paper stock 0.44515 × 35 × 0.55 =		8.57
Or a total of necessary to evaporate 1 lb. of water.		1080.52 B.t.u.

Comparing these figures we have:

Case 1. 1139.47
Case 2. 1159.08
Case 3. 1080.52
} Theoretical B.t.u. necessary to evaporate 1 lb. of water.

Thermal Efficiency

Now if a test should be made on three paper machines like those described in the three cases cited and the thermal efficiency was compared by computing the actual B.t.u. used against the theoretical necessary amount, we would obviously not have a fair comparison and the percentage of efficiency figure would not represent the true performance of the drier. The writer suggests that some arbitrary number of B.t.u. be taken and used in calculating the percentage of thermal efficiency in all tests of driers. A figure should be selected which would be easy to use in calculations and he suggests that figure be 1100 B.t.u. This suggestion is made because the writer understands that such a figure has been suggested by the Paper Drying Committee of the Technical Association of the Pulp and Paper Industry. Otherwise, he would suggest a figure of 1000 B.t.u. both because it is a simpler figure

to use in calculations and also because it would not then be possible for a test of a vacuum drier to show an efficiency above 100%.

Heat Losses of Standard Paper Drier

Now let us consider the possible heat losses in the three cases mentioned. Take first the losses of heat occurring in Case 1. While the average evaporating temperature was arbitrarily taken as 182.86° F. it, of course, could have been other temperatures below 212°. This Case 1 is illustrative of the standard paper machine generally used today. No two such machines, in all probability, ever operate at the same average evaporating temperature and even on any one machine this temperature is seldom twice alike, and to make matters still more complicated this evaporating temperature varies from one end of the machine to the other. The figure taken as 182.86° F. was assumed as an average evaporating temperature for a particular paper machine at a particular instant of time. We have shown that the loss of heat was due to heating the air. In any machine as large as this there is some heat lost as radiant energy but for our purposes we will ignore that item. It will not be a large amount of loss in any case as the heated metal is nowhere near the incandescent temperature and what heat is given off is largely reused in heating the vapor present.

Let us assume that the vapor leaving the drier section is thoroughly mixed with air and that the temperature of this mixture is 120° F. and its humidity 88%. Then from psychrometric tables the amount of water vapor mixed with 1 pound of dry air under these conditions is 0.0708 lb. and the mixture, as will be shown later, contains 107.5 B.t.u. total heat above 0° F. It has been heretofore assumed that the incoming mixture of air and water vapor is at a temperature of 82° F. and 50% relative humidity. Again from the psychrometric tables the amount of water vapor mixed with 1 lb. of dry air under these conditions is 0.0116 lb. and the mixture as will be shown later contains 32.5 B.t.u. total heat above 0° F. This 1 lb. of dry air has mixed with an additional amount of water vapor equal to the difference between the amounts in the outgoing mixture and in the ingoing mixture 0.07608—0.0116=0.0592 lb. water vapor.

If 1 pound of dry air mixes with 0.0592 lb. water vapor, then to mix with 1 pound water vapor we must supply $\frac{1}{0.0592}$ lb of dry air = 16.89 lbs. of dry air. Each pound of this air contains 107.5 — 32.5 or 75.0 B.t.u. more after going through the driers, so that 16.89 pounds of air must increase 1267 B.t.u. in heat content. This increase is caused by heating this air and vapor and adding to it 1 lb. of vapor containing 1139 B.t.u. (total heat of 1 pound of vapor at 182.86° F.). Therefore there must have been added by the driers 1267 — 1139 = 128 B.t.u. for each 1 pound of water evaporated from the sheet of water and paper. This 1267 B.t.u. represents the theoretical number of B.t.u. required to evaporate and provide means to remove 1 lb. of water vapor from the sheet of water and paper, and is the best possible performance if there are no other losses, under the temperature and humidity conditions stated. No account has been taken of additional heat lost by evaporation from the wet end of the machine or heat (or mechanical energy) which has to be supplied to remove this mixture of air and vapor from the machine room. In winter an additional amount of heat is necessary to bring the outdoor air to a temperature somewhere near that assumed for ingoing air.

The total heat per pound of air for ingoing and outgoing conditions as used in the foregoing calculations has been figured out from the formula—

> Total heat = [total heat of vapor at wet bulb temperature + (specific heat of steam × difference between wet and dry bulb temperature)] × weight of vapor per 1 lb. of air + specific heat of air × dry bulb temperature

Psychrometric charts, which are usually used to determine these figures do not include the heat of the liquid, but only latent heat of vapor at the wet bulb temperature. This is done because in adiabatic drying only latent heat of vapor and sensible heat of air are utilized and the two balance. In our calculation we are adding heat from the driers and there is a change in heat of the liquid between ingoing and outgoing conditions. The use of these charts in drier calculations results in neglecting an amount of heat which will materially affect efficiency figures. If total heat figures are taken from these charts we find that the ingoing air contains 32.1 B.t.u. per pound, and the outgoing 101.5 B.t.u. per pound or a difference of 69.4 B.t.u. picked up in going through the dried. This 69.4 X 16.89 lbs. air would give a total of 1172 B.t.u. per pound of water evaporated or 1172 — 1139 = 33 B.t.u. supplied by the driers to heat air, against an actual amount of 128 B.t.u. This shows the magnitude of the error which would be made were the charts used in making this calculation.

It will readily be seen from this that there is a certain fixed amount of air and a certain fixed temperature of that air which it would be necessary to use for maximum efficiency. It would be better to have this incoming air free of moisture. This cannot be had, however, and it varies each day and with every hour of the day and is decidedly different in summer and winter.

One interesting case has been brought to the attention of the writer, that of a paper mill in the extreme southern part of the United States, in which, during the summer months, the temperature of the outside air often exceeds 100° F. and the humidity is extremely high. This gives a condition such that the air entering the drier section has a very large amount of water vapor mixed with it and in passing through the bank of driers experiences difficulty in finding additional space in which to distribute the vapor coming off the sheet of paper and water. This condition is so bad that the drier part has been segregated from the rest of the machine by partitions and steam heating coils have been put in the drier room bringing the temperature of air in this room up to as high as 140° F. and even higher, thereby making it possible to dry paper, but impossible for men to work in the room. This, of course, is a very unusual case but all paper machine rooms are noted for being hot and humid.

Tests on Standard Paper Driers

Many tests on paper machine driers have been run and from the data collected results have been computed that did not properly show the true conditions of affairs due to errors, not so much in collecting the data as in not collecting sufficient data, and then not properly using it in computing values for per cent thermal efficiency, etc. As an instance of this the writer checked over a test of a drier run when the outdoor temperature was 20° below zero and the temperature of the air in the machine room was about 80° F. This latter temperature was used in determining the heat given to the air in passing through the drier section. This is, of course, a wrong assumption as the air most certainly had to be heated from 20 to 80° F. as the air at the start had of necessity to come from outdoors and was heated somewhere in the mill to 80° F. before it got to the machine room. Changing the calculations in this particular test gave only a very modest per cent of thermal efficiency whereas before the correction was made the thermal efficiency showed as a high figure. This is a common type of error that is often deduced from accurate data.

Running an accurate test of a standard paper machine drier is no small task. Much elusive data has to be obtained if any results worth while are to be obtained. One of the most difficult tasks is to get accurate data as to the quantity, temperature and humidity of air entering and leaving the drier section. It is likewise difficult to get evaporating temperature. We know in cases such as those illustrated by Case 1, which is of a standard paper machine drier, that we cannot, as in Cases 2 and 3, take the external pressure on the sheet of water and paper and figure the evaporating temperatures from that pressure by referring to the steam tables. We must actually measure by means of a thermometer or thermocouple, or other device, the actual temperature of evaporation. This in itself is difficult. We obviously should

not take the temperature of the drier shell and call that the evaporating temperature. Also, as pointed out heretofore, this temperature varies from one end of the machine to the other and must again vary when the paper passes from one drier to the next. The writer knows of no way of getting accurate readings of the temperatures of evaporation at various points along a bank of driers, let alone averaging them up for a total average for the whole drier section.

There has been a widespread idea that the thermal efficiency of standard paper machine driers may be fairly high. All tests about which the writer has full information have been found to be very low, many of them less than 50% efficient and very few over 60% efficient, and if more accurate tests were run he is confident the efficiency would show still lower as the errors he has found in such tests have very generally been such that the efficiency of the drying was shown to be higher than warranted by a close study of the data taken.

Having considered the heat losses in Case 1, let us now consider the same losses occurring in Cases 2 and 3.

Heat Losses of Enclosed Drier

In Case 2 you will recall we assumed a drier section completely cased in, with only a sufficient opening left, so that atmospheric pressure would exist around the paper but no air currents were permitted to remove the vapor. The water here actually reaches the boiling point, namely 212° F., and is forced out of the opening as vapor or steam at 212° F. The heat from this vapor is available throughout the mill wherever the paper maker may be able to find use for it. This heat corresponds in Case 1 to the heat that the paper maker might recover from the vapor leaving the drier section, some of which he can and lately does collect by means of economizers. The vapor given off in Case 1 we have shown had a temperature of 120° F. and because of its low temperature is not nearly so desirable or useable as the vapor given off in Case 2, which is at 212° F. and which also has little air mixed with it, which latter fact gives this vapor much more value. It must be remembered here that the sheet of water and paper coming into the drier in Case 2 brings in with it a small amount of air, and that tne so--called vapor coming off is a mixture of air and vapor and not in any sense true vapor or steam, and for this reason cannot in all cases be used as such.

To appreciate properly the heat losses in Case 2, let us assume that the drier shells in all the three cases cited are filled with saturated steam at 5.3 lb. gage pressure which has a temperature of 228° F.

It can readily be seen that as the evaporating temperature is 212° F. the temperature of the outside of the drier shell must be something greater than this or there would be no transfer of heat. The source of the heat, however, is only 228° F. and the difference in temperature between the outside of the drier shell and the evaporating temperature has been shown governs the rate of evaporation. In Case 2 this must necessarily be a small difference and the drying section of the paper machine will have to be large and contain many driers. The casing surrounding these driers will, therefore, also be large and on the inside will be subjected to vapor at 212° F. The loss of heat will be only the loss due to radiation from this casing, plus the additional heat or mechanical energy which we must supply to remove this vapor. This, of course, would be reduced by applying heat insulating material. There are no air currents passing through the bank of driers and the thermal efficiency could conceivably be very high. The objection to a drier of this type would be principally to its large size and also to the fact that the paper is dried at a high temperature, which in the opinion of the writer is injurious to the fibers and also causes excessive shrinkage.

Heat Losses of Vacuum Drier

The heat losses in Case 3 illustrated by the vacuum paper machine drier are similar to the losses shown in Case 2. However, as will be pointed out these losses are much less and may theoretically under certain circumstances be made an actual gain. In Case 3 cited earlier we showed that the sheet of water and paper was subjected to a vacuum of 28 inches of mercury and that the evaporating temperature was 100° F. This evaporating temperature we have shown gave a very large temperature difference between itself and the temperature of the shell of drier and hence a very rapid evaporation causing the vacuum drier to require a small number of driers, often less than half the number necessary in even a standard paper machine drier of modern construction. Thus the area of the casing exposed as a radiating surface is relatively very small, and the inside of this casing is only at a temperature of 100° F. while the outside is exposed to room temperature, which we have taken as 80° F. in all calculations so far. This small temperature difference and small area, which latter may also, as in Case 2, be covered with insulating material, make for an exceedingly low heat loss and hence a very high thermal efficiency. All the vapor is condensed by the condenser and all the heat is returned to the paper maker in the form of 100° F. water for whatever use he can make of it. In a northern mill in winter this warm water becomes a valuable asset.

Unlike Case 2, the vacuum drier has a very low drying temperature, thus not injuring the fibres by heat, the paper is shrunk less, and the drying unit is very small and compact.

The writer last summer witnessed a test of a vacuum drier during which test a vacuum of over 28½ inches of mercury was maintained. This gave an evaporating temperature of 90° F. and as shown this was the temperature of the casing enclosing the driers. The room temperature was well over 90° F. and in this particular case the drier casing was not giving off heat units to but actually taking heat units from the surrounding air.

It is, of course, possible to build a vacuum drier in stages starting with the first stage at any desired pressure or vacuum and taking the vapor from one stage to use as a heating vapor for the next stage just as is done in a multiple effect evaporator. So far this has not been deemed wise as mechanically the drier would be greatly complicated and its size greatly increased, both of which are undesirable. However, if this were done an efficiency would be gained as in the case of the multiple effect evaporator, which, in fact, is just what the drier would become.

Another Loss To Consider

There is still another loss to be considered in Case 3. Let us assume that the vacuum drier was supplied with a surface condenser. In this case the cooling water is passed through the condenser. This may be water used anywhere in the mill and the small increase in temperature of this water is a gain rather than a loss, especially in winter, and no pump is required as it flows through the condenser which becomes part of the mill piping system. The increase of friction due to the water passing through the condenser is negligible. If, however, for some local reason a surface condenser cannot be used, it may then be necessary to pump this cooling water. This is a relatively small amount of power, however, for if a barometric or jet condenser be used the vacuum can usually be made to pull the water through the condenser if the location is carefully selected and the hot well level placed in a correct position in regard to the source of the cooling water. Power must be used however to run the vacuum pump. One of the characteristics of a vacuum pump is that it unloads at high vacuum and the quantity of free air to be handled is a small amount, being only 60 or 70 cubic feet of free air per minute for a large size vacuum paper machine drier. This vacuum pump is preferably steam driven and the exhaust steam is used in the driers. In this case the vacuum pump steam cylinder acts like a reducing valve in the line and the loss in B.t.u. is small. As all paper mill engineers are familiar with this calculation space will not be taken here to show such calculation. In a large size vacuum paper machine drier not over 30 hp. is required to drive the vacuum pump and this is not addi-

tional power as this amount of power is saved in that required to drive the vacuum paper machine drier over the standard type of drier illustrated in Case 1. This latter saving being due to a large extent to the fact that the vacuum drier is so much smaller and also to the fact that all driers, felt carrying rolls, are mounted on ball or roller bearings.

Power To Drive Fans, Exhausters, Etc.

It should be noted here that no mention has been made of power required to drive fans, exhausters, etc., which are commonly used in paper machine driers illustrated by Case 1, nor has mention been made of the fact that steam heaters and blowers are very generally installed in connection with standard paper machine driers to heat the air going into the machine room. Still another item that must not be forgotten is the heat sometimes used in steam pipes placed along the roof of the machine room to prevent or reduce condensation on the under side of the roof.

Losses of heat occur, of course, due to leaking steam traps, siphon pipes and radiation from steam lines and drip lines but these have been ignored. Steam traps and siphons can and should be kept in good working order and when in this condition should waste little heat.

It should be noted that from an efficiency standpoint the vacuum drier here again shows to advantage due to the fact that it contains so few driers requiring short steam and drip lines, few siphon pipes and few traps.

But one conclusion can be drawn from all of the foregoing, namely, that a standard paper machine drier is wasteful of heat and must necessarily have a low thermal efficiency while just the reverse is true of a vacuum paper machine drier. The very principle on which the latter operates necessarily makes it thermally efficient.

Conclusion

An endeavor has been made to show the various theories involved in drying paper and to explain the theory of how vapor pressure controls evaporation, and to point the way to a clearer understanding of the subject of drying paper. An attempt has been made to confine this paper to the thermodynamic comparison of paper drying methods. Where the text wanders away from this subject it has only been done with a view to making the subject matter clearer. It was the desire of the writer to confine himself to generalities and theories and where actual figures have been assumed and calculations made, they were made with the desire to show how such calculations should be worked out to give true and correct answers. It is hoped that some of the misconceptions may have been cleared up and that a clearer idea may be had of the thermodynamic principles involved in drying paper.

Report of the Mechanical Pulp Committee

By W. E. Brawn, Chairman

During the past year, the general development in all lines of groundwood manufacture has continued and progress has been made in the direction of both quality and production. A number of new mills have come into being, thereby increasing the yearly output. The magazine type of grinder has been adopted in several large plants, both in new development and in replacement of pocket type, indicating in these cases a preference for this type where large production is required.

Artificial Grindstones

The Committee has nothing to report in the study of artificial grindstones, except that several stones have been constructed, and are in operation on magazine grinders grinding four-foot wood.

During the past year, the Committee on Mechanical Pulp has developed a proposed code to be used for comparing grinders on all types operating under various conditions, and has endeavored to develop a common set of units and a common method by which such comparisons can be made. The original plan entertained by the Committee was to gather information from the various mills covering different types of grinders, but this idea was abandoned, since the Committee felt that its work should first consist of getting together a basis for comparison. The code is in a proposed form, and can be altered as found advisable. Later, if so decided, it can be adopted by the Technical Association as a standard code for grinder comparison.

There has been an important step forward in the development of freeness testing. The Sub-Committee on Standardization of Freeness Test of the Canadian Technical Section has, through the Division of Pulp and Paper of the Forest Products Laboratories of Canada, developed a standard freeness tester. This freeness tester is a thoroughly standardized and calibrated instrument. Its construction is based on the apparatus developed by A. B. Green. Great care has been taken in the design and construction to eliminate variations in machining which have heretofore existed, and each instrument before it goes out is completely calibrated by the Forest Products Laboratories. Your Committee had, during the past year, planned to investigate all the various types of freeness testing equipment in use, but when it found that the Canadian Association planned to develop a standard freeness tester. it was decided to wait until this work was completed. Your Committee feels that since the Canadian Committee has completed its work, its freeness tester should be investigated in detail, with a view to its possible adoption by the Technical Association.

From all that can be gathered, there has been no increased inclination or effort to recover groundwood tailings and refine them for mixture with first grade pulp. The tendency seems to be to screen as closely as possible, and where rejections to be refined are as low as 4 per cent, to waste them, or to some extent use them in mill wrappers.

The Committee this year is presenting two short papers on refiners and refiner practices, which bring out some of the factors and conditions met with in studying the problem of refining groundwood tailings. To date, with such refiners as are in general use at the present time, it appears that where refiners are used, the refined production can best go into a second grade pulp, and the screening system so arranged that as little stock as possible goes to refiners.

Should Make Thorough Study of Waste

A thorough study of waste in the manufacture of groundwood should be made, not only with regard to the refining of tailings, but also to reduce the amount of tailings produced. Wood conditions, grinder construction, and method of grinding are the chief factors controlling the production of screenings, and the screening system takes them out according to the grade of paper made.

Your Committee felt that the importance of this phase of groundwood manufacture when drawing up the proposed code for grinder comparison, and the section of the code given over to Production Data goes into this with considerable detail. Very few mills today are operating with less than 5 per cent loss due to wasted screenings, and the refining of groundwood tailings is not generally practiced. Even though refined tailings may not make a satisfactory first grade of pulp, there are a variety of uses to which they can be put.

Your Committee recommends the continued and thorough study of the refining and using of groundwood tailings from the standpoints both of profits to manufacturers and conservation of paper-making materials.

Apparatus and Methods for Experimental Investigations of the Production of Soda Pulp†

By D. E. Cable, R. H. McKee and R. H. Simmons *

It is common knowledge that in most pulp mills the length of chips (with the grain) obtained with a given chipper varies over a rather wide range. Some idea of the variety of chip sizes obtained from a commercial chipper may be seen in looking at the following table (taken from an article by McKee and Cable in the March 6, 1924, issue of PAPER TRADE JOURNAL).

Character of chips with respect to size

Length of chips (with the grain)	Per cent of Total weight
½ inch or under	6.9
½ in. to 5/8 in.	13.2
5/8 in. to ¾ in.	11.3
¾ in. to 7/8 in.	24.5
7/8 in. to 1 in.	26.5
1 in. to 1⅛ in.	17.6
Total	100.0

The chips in this case were cut from a bolt of longleaf pine by a chipper in a Pennsylvania mill about three years ago.

A study of the literature on pulp and paper manufacture shows that, apparently no one has ever prepared wood chips of a uniform length by the action of a chipping machine. This is true of small scale experimental work as well as for work on a tonnage scale.

A method of preparing chips of uniform length by hand has been described by Surface.[1] This method involves sawing and guillotine chopping operations which are quite slow and laborious. Furthermore, it leaves the chip ends in a different physical condition than is obtained in cutting the wood by means of a chipping machine.

Since certain experimental work which this laboratory was called upon to do required the use of chips of very uniform length, we have developed a method of operation described in this report which has met our requirements in this respect very successfully.

Our standard wood treating procedure for obtaining chips of uniform length and of a representative composition for a given species is as follows:

An effort is made to obtain a normal log of such a species, entirely free of rot or decay of any kind and having as few blemishes as possible. This log is, preferably, one about 10 inches in diameter and 4 feet in length. A green log is preferred to one that has seasoned for any length of time.

Such a specimen bolt (selected by one competent to identify or recognize the species or kind of such wood) is cut in half and each half is split into six equal sector shaped prisms. The sector prisms of the lower half are numbered 1 to 6, adjacent sectors having adjacent numbers. The upper sector prisms are numbered 1′ to 6′ in such a manner that sector 1′ is on the diametrically opposite side of the original log with respect to sector 1. Similarly, sectors 2′, 3′, 4′, 5′ and 6′ are diametrically opposite the sectors 2, 3, 4, 5, and 6, respectively.

Sector prisms 1, 1′, 4 and 4′ may be taken for one size of chips, prisms 2, 2′, 5 and 5′ for another size of chips and sectors 3, 3′, 6 and 6′ for a third size of chips if lots of three distinct sizes from a given bolt of wood are desired. If only one lot of chips is desired it is easy to see how we could get a representative lot of chips by taking 1/6, 1/3, 2/3, or all of the sector prisms from a given log.

By taking opposite sectors of a log in this manner it is our belief that chips of more nearly average composition with respect to the entire log can be obtained than by any other method of selection. This method of selecting sector prisms from a log for a given lot of representative chips not only assures us of having the normal ratio of heartwood to sapwood common to the log from which it came, but also yields approximately equal weights of wood from opposite sides of the log.

Assuming that we wish to cut sector prisms 1, 1′, 4 and 4′ into chips of uniformly ¼ inch length (with the grain) the first step would be to shave off all bark and split these prisms into two or more sticks of triangular or equilateral cross section small enough

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[1] U. S. Dept. of Agric. Bulletin No. 80, p. 15.

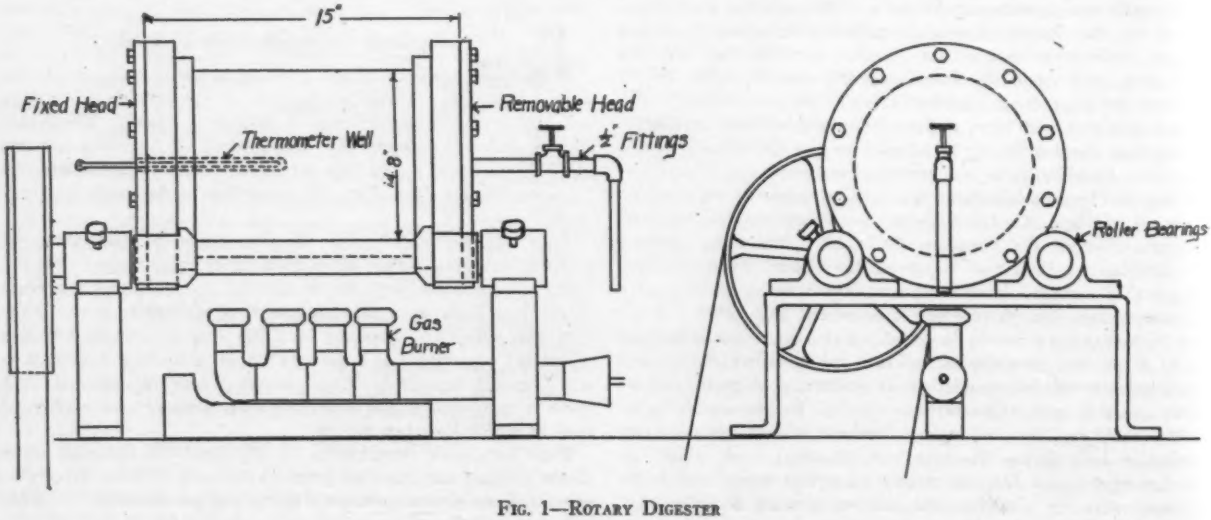

FIG. 1—ROTARY DIGESTER

to allow the stick perfect freedom in feeding it into the spout of our baby chipper (made by the Appleton Machine Company, Appleton, Wis.). This spout is roughly of square cross section and will take wood having a diameter of 4 inches or less. Each stick is freed of knots, stained areas or blemishes of any kind. It is then bored at one end with two holes of ⅜ inch diameter. One hole is made parallel with the grain of the stick to a depth of an inch or two. This hole is designed to take the connecting pin (P) of the push rod (R) as shown in Fig. 2.

The other hole is bored through the stick ½ inch from the end and at right angles to the grain of the stick. This hole is for use in lashing the stick to the push rod, by means of a heavy cord (C). The stop pin (S) is fastened to the push rod as shown in Fig. 2 to prevent the pulpwood stick from being cut beyond the dotted line (L). This leaves a stump of each stick to be saved for future reference after the rest of the stick has been cut into chips. To obtain chips of ¾ inch length it is found necessary to use a pair of chipper knives ⅝ inch thick. By using other pairs of knives of thicknesses varying from ½ inch to 1 inch we are able to vary the resulting chip length from ½ inch to 1¼ inch.

During the chipping process an operator first starts the chipper and after the chipper disk is revolving at full speed he introduces the stick into the chipper spout and with a firm pressure of his hands against the handle (H) of the push rod he pushes the stick into the chipper as fast as the rotating disk with knives will take it. At the instant the stop pin (S) has nearly reached the mouth of the chipper spout the operator quickly withdraws the push rod with attached stump of stick from it.

In this way no chips shorter than those desired should be formed at any time during the entire course of the chipping operation. *Chips of shorter and varying lengths result in commercial chipping of wood due to the jumping up and down of the log as it is fed by gravity into the chipper spout.*

Naturally the original setting of the chipper knives together with a stick nearly filling the cross sectional area of the chipper spout prevent chips of any length greater than those desired from being formed. The length of chips being formed by the chipper is determined as mentioned above by the thickness of the pair of chipper knives used.

This method of preparing chips has been found applicable to all varieties of wood used in pulp manufacture. Woods as hard and dense as maple may be cut in this manner, although a 10 hp. motor such as we have is hardly powerful enough to chip a 2 foot length of stick of spout size (for wood as dense as hard maple), without retarding the speed of the chipper considerably.

After the wood has been reduced to the form of chips it will be noticed that many of the chips are held loosely together in clusters or "cards" after their passage through the chipper. The entire batch of chips is, consequently, passed quickly through a rapidly rotating Gruendler feed grinder. This grinder is operated without any under screen. The disintegrating action is caused by the initial impact of the revolving, hinged arms or bars against the falling chips. The chips are "batted" down into a receiving box below the grinder.

A small fraction of chip "cards" which are not separated in the first passage through the grinder are picked out by hand and again sent through the machine. Any sawdust in the sample formed by the action of the chipper or by that of the grinders is removed by shaking all chips on a No. 3 mesh wire screen. The entire lot of chips is carefully inspected and all oversize or knotty fragments are removed by hand. With this method of chipping and assorting less than 10 per cent and usually less than 5 per cent of the original wood was discarded, because of oversize, knots or undersize (mostly sawdust).

The screened chips are then allowed to air dry by spreading them on one or more large wire bottom trays which permits the unrestricted movement of the air of the room over or through the shallow bed of chips. Usually three or four days is sufficiently long to reduce the chips to the air dried condition. The amount of moisture retained by the wood chips, as for paper, is dependent upon the relative humidity of the air of the room in which the chips are dried.

This air drying operation was done to eliminate from our results any possible discrepancies due to changes in moisture content for a given lot of chips. It is easy to see that wood having only 5 to 10 per cent moisture content would be much less apt to lose or gain moisture on exposure to the air of our laboratory than chips containing 30 to 40 per cent moisture. Also, an error of, say, 1 per cent in the determination of the moisture content of chips ranging from 5 to 10 per cent would only entail about two-thirds as much error in estimating the bone dry weight of a given charge of chips as would be caused by an error of 1 per cent in the moisture content of chips having 30 to 40 per cent moisture present. The two effects are additive in pointing out the advantage of air dry chips over undried chips in highly quantitative work.

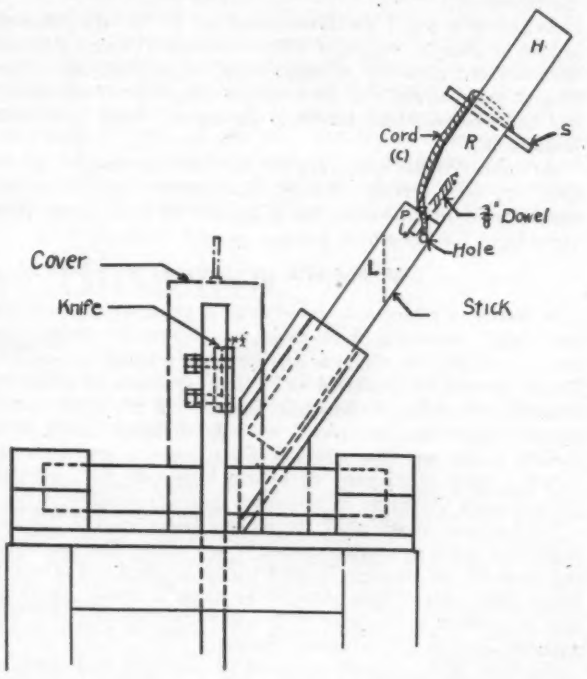

FIG. 2.—CHIPPER

After thorough air drying, the chips are mixed and then placed in a 40 quart milk can, having a fairly tight fitting cover. Wood that has been air dried in the above manner is found to give almost the same proportion of pulp (based on equivalent oven dry weights of pulp and chips) as would be obtained from the same wood in the green condition and without any air drying. The variation in moisture content of the air dried chips kept in milk can very slight from week to week.

Bacterial action or fermentation of chips thus dried is practically negligible. But with chips carrying much over 15 or 20 per cent moisture the moisture content changes appreciably and decomposition of the chips by bacterial action becomes quite noticeable when they are kept in closed containers for periods of several months.

Kinds of Soda Pulping Tests

A number of soda cooks were made, using small welded, steel, cylindrical digesters with flange connection for cover. These digesters had inside dimensions of 1⅜ inch diameter and 8 inches height. Six such digesters could be heated in a Freas oven at one time. After a considerable number of trials this type of soda

pulping test was abandoned, because of the difficulty we found in duplicating results when operating two or more cooks on a given material and working under the same conditions so far as we were able to determine.

We have, however, made a number of very satisfactory soda cooks by using the rotary soda digester shown in Fig. 1. This digester is a reproduction of the one in use at the New York State College of Forestry and was made for us through the kind cooperation of Prof. Harry E. Weston by a millwright at Syracuse University.

This digester is heated by gas and is rotated at the rate of 2½ r.p.m. by the aid of a ⅛ hp. motor and a system of belts and pulleys for reducing the speed of rotation to the desired rate. While being used the digester is covered with a sheet iron hood to minimize fluctuations in temperature caused by air currents in the laboratory.

As shown in Fig. 1 the thermometer end of the rotary digester is held in place by means of bolts. Although this end plate and the other end plate are separated from the body of the digester by soda pulp gaskets, it would have given much better satisfaction had the fixed head been welded to the digester flange rather than just bolted.

An ordinary brass gate valve for the relief pipe to the digester gave very poor service. We did find, however, on the recommendation of Prof. Weston that a No. 25 "All Iron" Crane valve (gate type) for 125 pounds pressure worked excellently.

Method of Cooking Used

In making a rotary soda cook, using a given lot of chips, the can (milk) containing those chips was thoroughly shaken with the cover in place to obtain as representative a sample as possible. The cover was then removed and exactly 4 pounds of poplar or 5 pounds of hardwood chips was weighed and put in the rotary digester which had been placed on end. Sufficient caustic soda cooking liquor was then added to the digester to give approximately a ratio of 25 parts of sodium hydroxide for every 100 parts of chips (based on its equivalent oven dry weight).

The per cent causticity of the cooking liquor used in our experimental work is usually around 97 per cent. The removable end plate of the digester is next bolted in place. A gas and liquor tight joint is here obtained by using a double gasket of soda pulp which is moistened with water after applying it to the machined surface of the digester flange.

The body of the digester is placed on the supporting stand as shown in Fig. 1 and is rotated slowly during the entire cooking period. The digester is heated by means of gas at such a rate as to reach the maximum working temperature in approximately an hour after the heating is started. In all our experiments, using the rotary digester an effort was made to hold the digester temperature at 170° C. as closely as possible. With a sheet iron hood in place over the digester it was very easy to make slight adjustments and hold quite closely to this maximum working temperature by using two bunsen burners with flames of medium size.

The digester temperature was indicated by a thermometer inserted into the thermometer well. The maximum temperature maintained is known to correspond to a steam pressure of 100 pounds gage. This pressure was selected for our experiments, since it is the pressure at which commercial soda cooks have often been made on a large scale.

At the end of the desired heating period the digester was removed from the supporting and rotating mechanism and was immersed in a can of *hot* water. The relieving valve was slowly opened after the contents of the digester had been cooled slightly below 100° C. to allow the escape of inert gases. When these had ceased coming off the removable end plate was taken off and the free spent liquor was drained into a beaker while *still hot*. This can easily be done inasmuch as the pulp fibers still cling together in the chip form.

After draining off the spent liquor the contents of the digester are dumped into a 30 liter galvanized iron can. Sufficient boiling water is added to give a thick, heavy consistency when the pulp chips are resolved into a magma of pulp by vigorous stirring with a strong stick. With a properly made soda cook the fiber bundles can be completely disintegrated after 5 minutes of energetic stirring. This is a mechanical action which accomplishes the same result *without beating* as is obtained in commercial practice by blowing the contents of a digester against the walls of a blow tank with an explosive effect, caused by the sudden drop in steam pressure from 80 or 100 pounds down to atmospheric pressure.

The disintegrated pulp is next transferred to a 72 liter galvanized iron can (water tight). It is washed four times with 65 to 70 liter quantities of water at 50° C., followed each time by filtration on a box, having a tightly fitting fourdrinier wire bottom. This wire is of 80 mesh and allows very few fibers to pass through into the filtrate. Those which do pass through are lost only at the beginning of the filtration and before the wire has been completely covered with a mat of settled fibers.

TABLE 1

TYPICAL SET OF DATA SUCH AS RECORDED FOR EACH ROTARY SODA COOK

Research Department, Oxford Paper Company, Brooklyn, N. Y.

Subject: Soda Cook—White Birch/R1 (Using rotary digester)

Date, December 15, 1924
File No., Project 11
Recorded by R. H. S.

Moisture in chips—7.8%.
Weight of chips 2268 grams (air dry weight) = 2091 grams (oven dry weight).
Volume of cooking liquor taken = 7.80 liters (Sp. gr. = 1.0705).
Total time of cook = 6½ hours.
Ratio caustic soda to chips (oven dry weight) = 0.247 to 1.00.

Time	Temp. °C.	Remarks	Yields
9:00 A.M.	—	Heating started	
:15	—		
:30	125		
:45	147		
10:00	164		
:15	171		
:30	170		Air dry pulp
:45	170		
11:00	170		Weight of pulp = 1001.2 (air dry wt.)
:15	170		Weight of chips = 2268 (air dry wt.)
:30	170		Per cent yield = 44.2% (air dry basis—rough calculation)
:45	171		
12:00 Noon	171		
:15 P.M.	169		
:30	170		Oven dry pulp
:45	169		
1:00	169		Moisture in pulp = 5.2%
:15	170		Weight of pulp = 949.2 (oven dry wt.)
:30	170		Weight of chips = 2091 gms. (o.d.wt.)
:45	170		Per cent yield = 45.4% (oven dry basis—exact calculation)
2:00	170		
:15	171		
:30	171	Digester cooled and	
:45	170	Pressure reduced.	
3:00	171		
:15	171	Undiluted black liquor drained from pulp = 4.32 liters	
:30	171	(before starting washing operation)	

Method of Determining Yield of Pulp

Several batches of pulp were screened by means of our small diaphragm screen, having 0.008 inch slots. This screen is one of special design and was made for us by the Wisconsin Foundry and Machine Company (Madison, Wisconsin). The ratio of screenings in these few cases to total screened pulp was so small as to be quite insignificant. Consequently on all other rotary soda cooks it was generally considered unnecessary to screen the product.

The washed pulp was placed in a muslin bag and pressed as dry as possible by means of a fruit press. It was then removed from the bag, broken into small lumps and placed on one of our fourdrinier wire covered trays and allowed to dry in the air of the room for several days. When completely air dried the pulp would be gathered together in a beaker and its weight determined. Moisture tests were made on the air dried pulp and the chips from which it was obtained. Allowing for these moisture factors, it was very easy to calculate the percentage yield of pulp.

Table 1 shows a typical log sheet of data and results obtained in making one of our experimental rotary soda cooks.

Reliability of Results Obtained

In interpreting results obtained by the use of our rotary soda digester it is well to keep in mind the fact that on account of our indirect method of heating there is no dilution of the cooking liquor within the digester such as one finds in the ordinary commercial soda digester caused by the partial condensation of the steam entering the digester during the cooking operation.

Wells [3] has stated that the 70 gallon soda and sulphate digester, used by the U. S. Forest Products Laboratory, although lagged with a heat resisting material, causes a condensation in making a soda cook which is six times as great as in a commercial sized apparatus of 3½ cords capacity. In the same report he presents data to show that with all other conditions kept constant an increasing ratio of condensation to weight of chips leads to increasing yields and slightly lowering bleach consumption for the resulting pulps.

Thus, an increase in total condensation from 20 gallons per 100 pounds of aspen chips to 60 gallons per 100 pounds causes an increase in yield from 44 per cent to 47 per cent and a decrease in bleach requirement of resulting pulps from 12.7 per cent to 11 per cent.

In considering our results it seems more than likely that our yield values of soda pulps obtained by means of a gas heated rotary digester would come nearer to indicating corresponding values obtainable in large mill digesters than would be indicated by work done, using such a direct heated experimental digester as that used by the Forest Products Laboratory at Madison where the condensation ratio is about six times as great as is encountered in mill practice. Furthermore, our results should represent yields slightly lower rather than higher than is obtainable under mill conditions.

As for the question of circulation of cooking liquor in contact with the digester chips, one can confidently say that slow and uniform rotation of our digester which is nearly 80 per cent full of chips and liquor gives a circulation effect fully as good as can be obtained in any form of direct heated commercial digestion.

In considering the question of reproducibility of results in using the above apparatus and methods it is sufficient to say that occasionally a given set of wood chips cooked two or more times under our standard conditions will give yield figures differing as much as 2.5 per cent (based on the weight of wood used). In four cases out of five, however, we have found that our yield values check each other within 1 per cent or less.

[3] "The Effects of Moisture Introduced into the Digester in the Cooking of Soda Pulp." Mimeographed report by the Forest Products Laboratory, dated April 14, 1916.

High Density Bleaching

By A. D. Merrill *

The title under which this article is written is somewhat misleading as the whole data submitted will only cover densities up to 17 per cent air dry which is relatively high in comparison with 8 per cent density but it is also relatively low in comparison with 30 per cent. However, we believe that those interested in bleaching are only interested in what it is possible to accomplish with apparatus and methods now available; this limits us for all practical purposes to densities below 17 per cent.

Result of Both Bleaching and Cooking

Pure cellulose is the result of both cooking and bleaching. If the wood pulp has not had a large percentage of the lignin removed during the cooking process, this lignin has to be removed in the bleaching process. We have bleached sulphite pulp in the Semco bleacher blown at all percentages of total SO_3 between 0.08 and 0.45 hot test, and it has been our experience that bleaching at a density above 12 per cent has a tendency to make the characteristics of the resulting pulp the same whether this pulp was originally cooked soft or hard, providing that the color of the bleached pulp is the same. As one superintendent expressed it, "Dense bleaching to the same color levels the pulp as regards its characteristics."

We have not as yet enough data to prove this point to our own satisfaction, however, we do know that pulp can be cooked much softer with a resulting saving in both sulphur consumption and bleach consumption and obtain a bleached product which has crepeing characteristics similar to a very hard pulp, which was formerly bleached at a density of around 4 per cent. This is the result that might be expected as there is no logical reason why a pure cellulose should have different characteristics.

From data obtained, there is apparently no great saving in bleach consumption between 10 and 17 per cent consistency, but the finished product is much better at consistencies above 12 per cent. Further, we have been unable to notice any change in the bleach consumption or characteristics of the bleached pulp between 12 and 17 per cent consistencies, all other factors being equal. In our standard Semco unit, we can bleach at all densities up to 17 per cent air dry but the only advantage in going over 14 per cent is to get more pulp in the same space. This advantage has to be paid for, of course, in power.

Color of the Finished Product

Another point which we believe should receive serious consideration in all bleaching is the color of the finished product. It seems to be a general desire on the part of all paper makers using bleached pulp to insist on a high color regardless of whether the bleached pulp is to be used in a white or a colored sheet. Although the writer has had very little experience in the coloring or dyeing of pulp, he has been informed by specialists in this line that one of the hardest things to color is an absolutely pure cellulose. Further for best results on colored papers, we understand that if the bleached pulp is not brought up to a high color the consumption of dyes will be lower and a more uniform product will result. This is a point that we do not believe as yet has received the attention that it should and we suggest that this matter be taken up definitely by the Technical Association in order to determine exactly the effects, as it would be foolish to expend the chlorine, power and time necessary to bleach pulp white if this expenditure is going to increase the cost of coloring the pulp later.

Advantages of Bleaching at High Density

The advantages of bleaching pulp at relatively high density are as follows:

Less space required
Smaller investment per ton
Less power per ton of pulp up to 14 per cent density
Lower steam consumption
Lower bleach consumption.

In general it has been our experience that the resulting product when bleaching is carried on between 12 and 14 per cent density is better than at lower densities, that the use of steam for heating up to approximately 100° F. saves on the bleach consumption, the power and the time of bleaching, and improves the finished product. The use of air under pressure, blown in under the surface of the pulp shortens the bleaching time and cuts down the

* Stebbins Engineering Co., Watertown, N. Y.

power required on the agitator but has no other appreciable effect. We have always advocated the use of air and it is our opinion that admitting air into the pulp mass carries off the waste product produced in bleaching. We do not believe that the oxygen contained in the air assists materially as an oxidizing agent as this oxygen is not nascent. However, we do know that it shortens the bleaching time and assists in the circulation.

If bleaching is carried on in a covered tank, the carbon dioxide gases produced form a blanket on top of the bleached pulp which retards the reaction and if these gases are not blown out or exhausted, the bleaching time is considerably longer than where means are provided for removing these gases. As normally installed, our bleaching cells are open at the top and the top surface of the pulp extends above the top of the tank. This gives a free and exposed surface and the addition of air under pressure introduced beneath the surface of the pulp assists in carrying away the products of decomposition.

When bleaching by the batch method, our maximum bleaching time for a very hard stock is 3¼ hours and our minimum for soft stock is 1¾ hours.

Example of One Plant

In order that you may more readily understand it, take the example of one plant, where our bleaching system is installed. The average bleach consumption for one month based on all powder mixed is 12¾ per cent, bleaching continuously; and at another plant where we are bleaching by the batch method, the average bleach consumption for one month was 96 pounds of chlorine per ton of pulp equivalent to 274 pounds of bleach powder or 13.7 per cent. The minimum bleach consumption at this plant was 62 pounds of chlorine per ton of pulp, equivalent to 178 pounds of 35 per cent bleaching powder or 8.9 per cent. The maximum was 128 pounds of chlorine on an extra hard stock which is equivalent to 18¼ per cent of 35 per cent bleaching powder. In both places about half of the pulp is cooked hard and the other half soft.

In a previous article, we have given data regarding results obtained bleaching continuously and we are giving below results of two lots bleached by the batch method, one hard and the other soft stock. These data are taken from the daily records kept at the mill and we believe are typical.

BLEACHING SOFT PULP

Stock—Mixed, hemlock and balsam. Easy bleaching. —
Wet weight of pulp, 21,500 lb. @ 35% equals 7,525 lb. a. d., equals 3.76 tons.
12½ in. of 30 g.p.l. liquor used.
74.67 gal. per inch equals 923 gal. bleach liquor used.
923 gal. @ 0.25 lb. per gal. equal 233½ lb. Chlorine.
233½ divided by 3.76 equals 62 lb. chlorine per ton of pulp, equivalent to 178 lb. of 35% bleaching powder per ton or 8.9% of 35% bleaching powder.

Filling time	1:15 hr.
Bleaching time	2: 5 hr.
Dumping	0:15 hr.
Total cycle	3:35 hr.
Density after addition of bleach liquor	16.9% a. d.
Temperature at start	70° F.
Temperature 1:30 hr. after filling	102° F.
Steam shut off at this point.	
Final temperature when dumped	110° F.
Average hp.	29.6
Power per ton of pulp, hp.	26.25
Fiber loss, approximate per cent	4
Total dirt counts before bleaching	339
Total dirt counts after bleaching	114

Total dirt removed, 225 equal to 66.6 per cent.
Color very good.
Steam per ton of pulp, lb. (approximately) 600

BLEACHING HARD PULP

Stock—Tamarack—Hard.
Wet weight of pulp, 18,000 lb. @ 34.4% equals 6,200 lb. a. d. 20 in. of 30 g.p.l. liquor used equals 372.35 lb. of chlorine, divided by 3.1 equals 120 lb. of chlorine per ton of pulp, equivalent to 17.15% of 35% bleaching powder.

Filling time	1:10 hr.
Bleaching time	3: 0 hr.
Dumping time	0:15 hr.
Total cycle	4:25 hr.
Density after addition of bleach liquor	14.39% a. d.
Temperature at start	70° F.
Temperature 2 hours after starting	105° F.
(Steam shut off.)	
Average hp.	25
Power per ton of pulp, hp.	33.87
Fiber loss, approximate per cent	5
Total dirt counts before bleaching	338
Total dirt counts after bleaching	89

Total dirt removed, 249 equals 73.5 per cent.
Color very good.
Pounds of steam per ton of pulp, about 750

The Continuous Method

As regards bleaching by the batch or continuous method, the writer is more firmly convinced every day that the continuous method is the most easily controlled, operates with the lowest bleach consumption and gives the best results as regards color and other characteristics of the pulp. Batch bleaching at the best is a guess, the answer to which does not appear until the process is nearly finished as there is no one who can judge accurately in any way how much bleach a given amount of any pulp will require. Consequently, the man operating the system, if he is pushed for production will add an excess of bleach and if not pushed for production will put in slightly less than he guesses will be required. If he uses less bleach than is actually necessary, he has to add more later, which increases the amount of time required to bleach, as ordinarily he does not add this bleach liquor until nearly all of the liquor is exhausted. This means that the total bleach consumption on that particular batch will run higher than it would if he had used the exact amount of pulp. If he adds an excess of bleach, he is again wasting bleach and it also requires a longer time to work the bleach out of the pulp. Both of these methods are wasteful as regards bleach consumption, time and fiber loss. Further, considerable more labor is required bleaching by the batch method and a very much larger investment in bleachers and thickeners, is necessary.

When bleaching continuously, the operator is furnished with a color pad to use in comparing the pulp leaving the first cell in the series and he can keep this color very close. He is also furnished with another color pad to use in comparing the amount of chlorine in the pulp as shown by the regular starch iodine indicator. With these two guides he is able to regulate the amount of bleach liquor entering and to control the color of the pulp leaving the last cell in the series so closely that a much more uniform product can be obtained with considerably less bleach consumption.

Saving of Powder When Bleaching Continuously

From what experience the writer has had in bleaching both continuously and by the batch method, he is firmly convinced that there is at least a 2 per cent saving of powder when bleaching continuously as compared with the batch method. Further he is convinced that standard can be maintained by the continuous method and that it is impossible to get as uniform results by the batch method. Another point is that it only requires one man to operate a 50-ton continuous system in comparison with from two to four men required to operate a batch system.

With regards to density at which bleaching should be carried on, we believe as heretofore stated that the density should never be the controlling factor, rather it should be one of the controlled factors. To paraphrase Edouard Estaunie, "In bleaching, density should be a servant and not sit at table."

In comparing the above data, especially the horse power hours per ton, it should be borne in mind that the hard pulp requires a longer period of time, which explains why the horse power hours per ton are higher for the hard pulp than for the soft. From other data which the writer has on soft stock comparing well with the soft stock data given above, it requires 21.3 hp.-hours per ton when bleaching at a density of approximately 14 per cent.

We are gathering more data in reference to all factors entering into the bleaching of pulp and expect that before another year, we will have more information on this subject.

Power and Process Steam from Higher Pressures

By A. G. Darling *

From the character of inquiries received by manufacturing companies recently, there is a marked trend among industrial plants toward consideration of boiler pressures, considerably in excess of those now in general use in the industrial field. The relative pressures in present use are of the order of 100 to 250 pounds gage, while those under consideration are from 300 to 450 pounds gage. The purpose of proposed change can be none other than an anticipation of increased economy. It is of interest to note that both new construction and plant extension include the proposed higher pressures. A discussion of the expected results is in order, so that the advantages can be applied wherever feasible.

In contemplating a marked change in practice, considerable encouragement can be secured by observing similar changes in allied or other industries. The chief product of the central stations is electrical power from water or steam, so it is natural to look to this industry for information. Records show that there has been a steady increase in boiler pressures since the establishment of central stations. The 1923-24 report of their central body, the National Electric Light Association states that "these developments indicate that to-day, when higher pressures are spoken of, pressures of 300 to 400 pounds are no longer referred to, as was the case not many years ago; pressures of this magnitude have become standard pressures, and the field covered by the term 'higher pressures' has been advanced to pressures over 500 pounds." A prominent boiler manufacturing company reported recently that of approximately two and one half million square feet of heating surface sold for working pressures of 350 pounds or more, 400,000 square feet were for 650 pounds working pressure, and one for

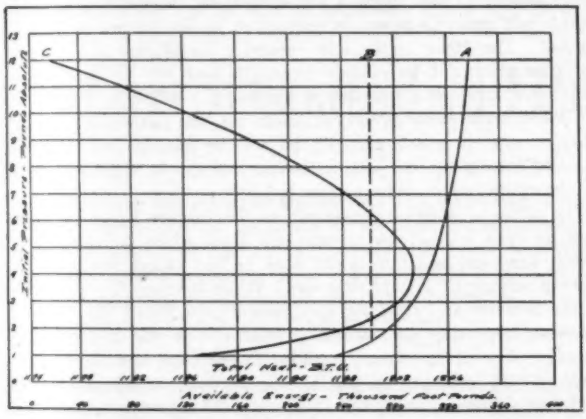

FIG. 1

1200 pounds pressure. The temperature range of these recent installations is from 550 to 750 degrees F, and averages about 650 degrees F. The 1200 pounds gage installation at Weymouth is designed for 700 degrees F. These installations indicate the trend toward higher operating pressures and temperatures.

Increase of Energy from Higher Pressures

In analyzing the basis for the change it is interesting to note the possible increased energy available. Fig. 1 illustrates the field of energy at various pressures of steam. Two curves are presented. That marked A shows the total available energy from increasing boiler pressures to a vacuum of 28.5 inches. The horizontal distance between the curve marked B and the A curve shows the available energy from the boiler pressures, to a supposed back pressure of 165 pounds. No superheat is included in either curve and adiabatic expansion is assumed. It is to be noted that the available energy continues to rise rapidly above 100 pounds to 350 or 400 pounds, while from there on the increase is less rapid. The purpose of the 165 pound curve is to show the energy between that pressure and the initial pressure available for production of power still leaving the necessary heat content required for sulphite digesters. This pressure is a fair sample also of that used for engines and turbines in many mills.

The effect of superheat has not been shown in Fig. 2. Theoreti-

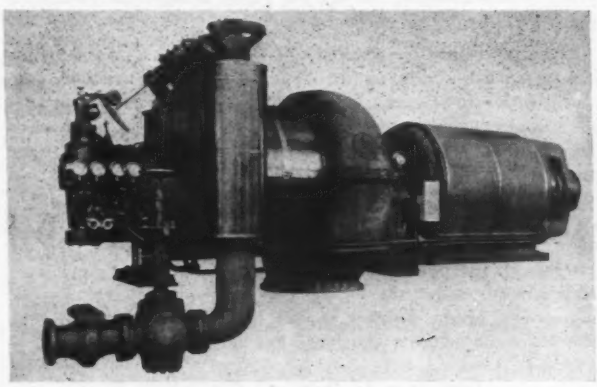

FIG. 2

cally, the gain is small but practically the gain is of sufficient importance to be taken into account. The losses occurring in an impulse steam turbine when the initial steam is dry, are of the following order:

	Per cent
Friction and windage loss in nozzles and blades	20
Steam leakage loss	3
Rejected energy (due to residual steam velocity)	3
Bearings, packings, etc.	1
Total loss	27
Efficiency of turbine	73

Of these losses, the first is the one which can be affected most by a change in initial conditions of the steam. It has been pointed out (by Messrs. Blowney and Warren) that there is reason to believe that there is practically no change in the individual turbine stage efficiency with increase in the average superheat of the steam in the stage. It is practically certain then that the change in average stage efficiency must then be due to the change in stage efficiency with change in moisture content of the stages in the moisture region. It is also suggested by H. M. Martin and Prof. H. L. Collendar that a portion of the improvement is due to the failure of superheated steam to condense, so giving up its latent heat during expansion. Tests in sufficient quantity have been made under both laboratory and operating conditions to prove that the actual gain is considerably in excess of the theoretical gain in efficiency of the turbine due to superheat. The actual gain due to superheat is a function of the amount of superheat and the initial pressure,—otherwise initial temperature, and is of the order of 3 to 8 percent. It may appear that in the industrial plant, the efficiency of the heat installation is 100 per cent except for stray radiation and friction losses due to the fact that energy lost in power manufacture is converted into heat and so regained in process. On analyzing this theory further, however, it is apparent that it may be more economical to reduce energy losses in the power producing part of the system and supply the deficiency from the boilers by passing the equivalent amount of energy in additional steam through the power unit to the process, thereby gaining more power.

* A. M. TAPPI, Engineer, General Electric Company, Schenectady, N. Y.

Temperature the Determining Factor

Since the first steps toward higher pressures were made, the central stations have been establishing practice based largely on properties of materials. While some higher conditions have been attempted, it has been established that temperatures in excess of 725 to 750 degrees F. are in the doubtful region. Manufacturers have determined that the strength of materials, available for the uses in mind, decreases above these values. In addition, a margin should be provided to offset operating conditions. Boiler, turbine, fitting, etc., manufacturers have, today proved and standardized on a maximum temperature of the order of 700 degrees F. as an operating upper limit. While some special cases have been initiated, using higher pressures, standard turbines are available for 400 pounds absolute. These values, then, practically establish the upper limit —400 pounds absolute, 700 degrees F., or a superheat of 255 degrees F.

The pressure and temperature to be selected for a central station can be settled wholly on the basis of maximum economy consistent with safe practice. The problem of the industrial plant adds another and possibly a more important factor, namely, the effect of temperature on materials treated by process steam. In some cases, bulk heat is required with no restriction on the method used to supply this heat. In other words, the heat may be furnished in a smaller weight of a high temperature or in a large weight of lower temperature. Other processes restrict the upper limit of temperature and, therefore, establish the initial steam conditions. What happens within the turbine between boiler and process can be restricted by the designer in only a limited manner consistent with his manufacturing standards and final costs.

Application to Pulp and Paper Mills

The application of the foregoing argument to pulp and paper mills is not difficult to appreciate. There are two essential requirements to meet—sensible heat in the form of steam for digesters, cookers, evaporators, drying, softening, and building heat-

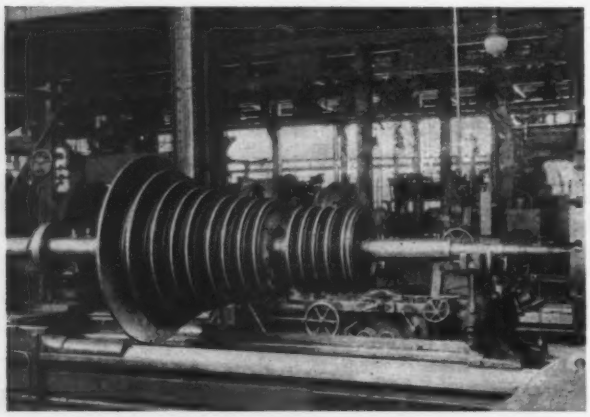

FIG. 3

ing, and heat in the form of available energy for producing the power needed to drive machines. Heretofore, heat required for process at temperatures corresponding to over 50 pounds gage has, in general, been secured direct from the boiler. Looking again at Fig. 1, curve C shows the sensible heat at various pressures, indicating a maximum at about 430 pounds. Superheat may be added to give greater sensible heat. It is expected that the coal cost in the size of plants common to industries and using the higher pressure will be equal to or less than that obtained with the present steam conditions. The cost of operation and maintenance remains practically a fixed amount, and the fixed charges on plant, increases very slowly, as the housing cost is less, somewhat offsetting the increase in the equipment portion. The total cost of operation will, it is expected, be materially less.

Two Possible Methods

There are two possible methods of adapting machine designs to the problem. Assuming a suitable boiler pressure and temperature, the lower pressure steam may be obtained through an extraction turbine having one or two extraction openings with non-throttling action, and combined with a condenser which is essential to secure constant speed or permit the unit to generate more power than is available between boiler and extraction pressures. If, on the other

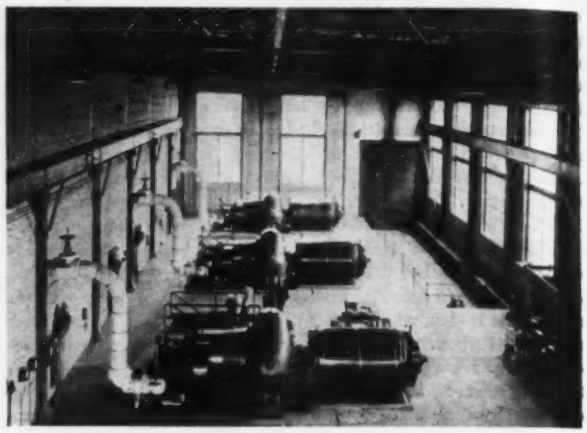

FIG. 4

hand, a suitable self-governed electrical system can be utilized to establish constant speed, a non-condensing turbine may be used which will generate power in proportion to the process steam required. The latter is the less expensive installation in cost per kilowatt generated by process steam, as both the turbine is less expensive, and the condenser is eliminated. Many modifications of these main methods are available for the particular circumstances, one of which partially offsets the variable load on the non-condensing turbine with its boilers and can be applied as well to the extraction machine and its boilers.

By adding a steam accumulator to the process steam pressure line or lines, a reservoir is provided from which to draw peak steam demands, and into which may be fed excess power steam during periods of low process use. While tending to reduce the boiler capacity and reducing the demand capacity of the turbine, likewise improving the operating efficiency of the boiler plant, another piece of equipment is added to the plant and the extraction or back pressure on the turbine must be raised to provide sufficient difference in pressure to permit the accumulator to function.

In plants using suitable turbines operating at lower pressures, an improvement can be made in their operating efficiency. If the high pressure turbines are designed to exhaust at temperatures suitable for process, it is possible to divide the exhaust steam into two portions—that required for process and that required or which can be used in the lower pressure turbines.

The efficiency of the latter will be materially improved by added superheat in their throttle steam and other losses will be offset. Resuperheating can be accomplished either in the high or low pressure boilers or by separate superheaters. This suggestion is an accepted one in central station practice but applied to turbine stage resuperheating. Reheating of boiler feed water at the higher exhaust conditions will cause an increase in the efficiency of the cycle.

Multistage Condensing Turbine

The type of turbine that best lends itself to this field is the multistage design with its inherent high economy. The cost of a

larger number of stages over a smaller number is well justified by the improvement in water rate. In developing such a turbine which has been in service now for several years, the accumulated experience of previous years and a forecast of future requirements were taken into account.

Figs. 2, 3, and 4 illustrate respectively the assembly, rotor and an installation of multistage impulse condensing turbines.

The significant features of the design are:

Three section casing, consisting of high, intermediate, and low pressure sections, facilitating manufacture for a diverse number of operating conditions with a minimum number of patterns and tools; the use of a double row of buckets in the first stage wheel to utilize the steam most efficiently; small diameter wheels in the majority of stages so eliminating high peripheral speeds and reducing the width of buckets, all assisting in reduction of losses; governor of straight centrifugal type relieved from heavy duty, by operating only an oil pilot valve; non-throttling multiple valves with one main part valve for use up to half load; possibility of extracting steam at various pressures for stage heating.

The same practice applies to the noncondensing as to the condensing turbine, except that the low pressure casing is changed. For extracting steam, the non-throttling internal grid valve inserted at a suitable stage pressure permits holding the desired pressure with variable quantities of steam.

It is sometimes desirable to obtain two low pressures from one turbine. Double internal grid extraction valves can be inserted at the proper stage pressure and variable quantities of steam taken out. The governor holds the speed with such conditions while steam passing through the last stages makes up any deficiency in extracted steam energy to produce the desired electrical output.

Entrance and nozzle losses are reduced to a minimum and flexibility of control is provided by one main and several auxiliary valves, each having its own port and nozzle. The main valve permits sufficient steam to flow to produce about one-half load. Secondary valves are operated in succession and give accumulative port openings distributed around the periphery of the first stage wheel. The entire control is hydraulic by means of oil pressure supplied by an integral oil pump operating against spring pressure.

A great deal of information has appeared in the technical press recently which will be found of considerable value to those interested in a further study of this subject. Installations have been made and are operating at the pressures and temperatures referred to, though the industrial field has not taken up the practice as yet.

In the preparation of this article, reference has been made to the work of other authors, and from whom a great deal of assistance has been obtained. In order that acknowledgment can be made to these authors, a bibliography is appended.

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Report of the Prime Movers Committee of the National Electric Light Association, 1924.

Report of Coated and Processed Paper Committee

By Donald V. Lowe, Chairman

In submitting this report no attempt will be made to discuss work done during the year, as the papers presented at this meeting speak for themselves. I do wish to say, however, that I have been pleased at the interest shown by those in a position to contribute.

The report, therefore, becomes essentially an outline of work which may, with advantage, be followed further.

Clay

In the discussion of a paper on clay presented a year ago, the subject of the moisture content received a surprising amount of attention. It appears that this basic raw material, literally the foundation of the coating industry, is bought and sold largely without any attempt being made to regulate its water content. This subject is one not dissimilar to the moisture content of pulp, —certainly no more difficult of solution,— and one which should have serious attention by the Association as well as the industry.

Casein

Since the introduction of casein as a binder instead of glue some 25 or 30 years ago, the change has been so complete that some mills today are practically without experience in using any other material. However, with the increasing demand for milk in the production of foodstuffs, and the ever increasing number of uses to which casein is being put in the arts, it is a real question whether, within a few years, the industry will not be forced to find another cheaper adhesive. The fact that a large percentage of the coated paper used is subjected to printing processes in which water resistance—that peculiar property of casein sizing,—is not necessary, indicates that substitutes now known and slightly used may be adopted with economy. This move, when necessary, will be effected more easily and cheaply if it has been preceded by a study of the requirements of printing surfaces and their standardization. In such a work it seems as though the Association should cooperate, if possible, with representatives of the printing and ink industries and such organizations as the Lithographic Technical Foundation and the National Association of Glue Manufacturers.

Satin White

One of the most interesting problems, from a purely technical standpoint at least, in the coating industry has to do with satin white. Here is a material long supposed to have a simple and definite chemical structure which, in use, appears to amend its constitution at every turn. There is practically no literature of importance dealing with it—every mill apparently has developed its own "secret" rules for its use. From an economic point of view, it appears relatively unimportant as it sells for a low price and the total production is not large. However, until mills using this material give their chemists more freedom of discussion, it is likely that this interesting chemical problem will be deprived of any worthwhile development. It is to be hoped that as time goes on, and more technically trained men rise to positions of responsibility and authority, the coating industry will awaken to the fact that through mutual confidence and the interchange of ideas and knowledge can come great good to every individual. The more we know, the better we serve, and service leads to prosperity.

The Application of Hydrogen Ion Control to the Manufacture of Pulp and Paper

By W. A. Taylor *

It has long been known that acidity is an important factor in the various steps of the paper making process, but, until comparatively recently, that is until hydrogen ion control methods were developed, it was not realized of just how great importance this factor is.

Up to the time of the introduction of hydrogen ion methods, acidity was regulated chiefly by tests with litmus paper and by titration. It has been shown that litmus paper is very unreliable, as hydrogen ion measurements proved that solutions which were pronounced definitely acid by litmus tests were in fact alkaline, and vice versa. On the other hand, titration methods often give very erroneous and misleading results, as titration measures only the total amount of acid and gives no idea of the active acidity. Hydrogen ion measurements, however, do give an accurate measure of the amount of ionized acid or the actual concentration of H ions in a solution. Since this, rather than the total amount of acid present, is the important factor in the great majority of chemical reactions, hydrogen ion control is rapidly being adopted in practically all manufacturing processes, such as pulp and paper, glue, gelatine, sugar, dyestuffs, water purification, sewage disposal, rubber, tanning, flour, electroplating, general chemicals and innumerable others.

We shall first discuss the importance of control of acidity in the manufacture of paper, and then explain the meaning of hydrogen ion concentration and pH values. Suffice it to say here that hydrogen ion concentration or active acidity is expressed in figures which are called pH values. As will be explained later, the value pH 7.0 denotes absolute neutrality. Values lower than 7.0, such as pH 6.8, 6.2, 5.4, etc., denote acidity, the degree of acidity increasing as the numbers decrease. On the other hand, values higher than 7.0, such as 7.6, 8.4, 9.2, etc., denote alkalinity, the degree of alkalinity increasing as the numbers increase.

Paper Manufacture

The liquors used in the manufacture of pulp by the various processes are either very highly acid or very highly alkaline, that is they contain large quantities of ionized acid and alkali respectively. This means that large variations can be made in the amount of acid or alkali added, without changing the amount of acid or alkali to any considerable degree. The pulping does not therefore lend itself to a hydrogen ion control.

The amount of caustic, sulphite, etc., is usually determined by titration. In this work it has been the custom to use indicators such as phenolphthalein and methyl orange. Much better results can be obtained by using the sulphonphthalein indicators. This series of indicators covers the entire range from high acidity to high alkalinity, and it is therefore possible to select indicators which will give an end point at the exact acidity or alkalinity desired, that is at the caustic, carbonate, sulphite end point, etc. Since the ranges of these indicators overlap, it is usually possible to titrate with two indicators and thus check results. In addition, a much better end point is usually obtained with the sulphonphthalein indicators. This is especially true of Bromphenol Blue which is the sulphonphthalein indicator corresponding to Methyl Orange. The color change of Bromphenol Blue is from yellow to deep blue and the end point is therefore much more sharp than is the case with Methyl Orange.

In the remaining steps of the paper making process however, the acidities and alkalinities are much lower, so that much smaller changes in the amount of acid or alkali added affect the amount of active acidity. Therefore these steps should be controlled by hydrogen ion measurements.

Pulp may be neutral, acid or alkaline, according to the process by which it is made and the thoroughness of washing. The reaction of the pulp will therefore have some influence on the amount of acidifying agent which is added to precipitate the sizing, the efficiency of the sizing agent, etc. This factor is of special importance when slush pulp is used. Some paper manufacturers, who make their own pulp, store it as slush pulp and use it as such. It is apparent that unless the pulp is thoroughly washed, the amount of acid or alkali in the slush pulp will be much greater than the amount in the same material in the form of lap pulp. This is necessarily true since a large amount of the acid or alkali would be removed with the water in making lap pulp. Also in mixing soda and sulphite pulp, if they have alkaline and acid reactions respectively, the final reaction of the pulp would of course depend on the relative amounts of acid and alkali originally present in the two materials.

The importance of accurate control of acidity at this point is therefore apparent. In many cases it may therefore be advisable to make hydrogen ion concentration, or pH value, one of the specifications for pulp.

Bleaching

It is known that wood pulp prepared by the soda or sulphite process is very likely to go back in color if it stands in contact with the exhausted bleach liquor, especially at high temperatures. This undoubtedly depends, at least to some degree, on the hydrogen ion concentration. Hydrogen ion control could therefore no doubt be applied not only to the washing of the pulp after bleaching but also to the bleaching operation itself.

Beating

Sutermeister, in his book, "Chemistry of Pulp and Paper Making," states that "the hydration effect of the beating process determines very largely the character of the paper made. It is possible to make from the same raw material, by varying the beating process, such widely different products as blotting paper and grease proof parchment. Ignorance of the relation of cellulose and atmospheric humidity is also one of the chief causes of trouble in printing plants, where the papermaker's products becomes the publisher's raw material." It has been reported that the beating process can be controlled by hydrogen ion measurements, but we have not been able to confirm this statement. It, however, shows the trend toward the adoption of hydrogen ion control to all steps of the process.

Engine Sizing

The point in the paper making process at which control of acidity is of the greatest importance is, however, in the precipitation of the sizing. The water which is used in paper manufacture is in most cases alkaline. The reaction of the pulp will of course affect this reaction but, if the pulp is neutral, the natural alkalinity of the water is increased by the addition of the sizing agent which is usually rosin, this being added in the form of an alkaline rosin soap. This additional alkalinity will of course depend on the percentage of free rosin in the sizing.

It has long been known that the stock should be "slightly acid" during a part of the beating and at the time of delivery to the paper machine. This acidity is usually obtained by the addition of alum, which also precipitates the sizing. "Slightly acid" is a

* Member TAPPI; Vice Pres., LaMotte Chemical Products Co., Baltimore, Md.

very indefinite term which varies enormously, depending on the method of testing and on the meaning of the term to various operators. If the stock is too nearly alkaline, the sizing will not be completely and efficiently precipitated. On the other hand, additional alum over that necessary for precipitation of the sizing, adds to the cost of manufacture and has a harmful effect.

The result of the crude methods of testing which have previously been used has been that, in order to make sure that the sizing is completely precipitated, a large excess of alum is almost always used. While a slight excess is necessary, a very considerable part of the alum ordinarily used is lost, as is proved by its presence in the back water.

Actual experience in various mills has shown that this excess has varied from 50 to 500% over that actually required. Excess alum may give a stiffness or rattle to the paper, but these properties can be better and more economically obtained by other methods, especially since excess alum results in acidity in the paper, which may not only cause it to deteriorate, but may give serious trouble in dyeing and coating, and also to the printer due to corrosion of type and plates. In addition, high acidity of the beater furnish corrodes metal parts of the beater and paper machines, thereby greatly decreasing their efficiency and life.

Tub Sizing

We have discussed above the effect of acidity on engine sizing. It is of equal importance in tub sizing. For example, suppose glue is used as the sizing agency. It is known that the isoelectric point of glue, that is the acidity at which it has minimum properties, such as solubility, absorption, swelling power, etc., is at a pH of about 4.7. Maximum retention of glue by the fiber will occur at this point. Since the amount of glue necessary for obtaining a definite amount of sizing depends on its retention by the fiber, the importance of accurate control of acidity is readily seen.

Sutermeister states that for use with gelatine in surface sizing, alum containing free acid may cause brittleness of the paper, and act injuriously on the metal plates used in printing. The presence of free acid in the alum can easily be detected by a simple hydrogen ion measurement.

Coloring

Since few papers are made without coloring matter of some kind, the importance of accurate control in this operation is apparent. It is of course realized that the shade depends to some extent on the beating of the stock and the calendering of the finished paper. These factors being constant, however, the shade obtained and the amount of dye which is retained by the fiber depend to a very great degree on the active acidity or hydrogen ion concentration of the bath. This is undoubtedly one important reason why manufacturers have such great difficulty in matching the shade in different batches of paper. Whether dyes which give satisfactory results at the acidity usually obtained are used, or whether the acidity of the beater furnish is regulated to the point at which a desired dye can be used, accurate control of acidity is of equal importance.

Briggs and Bull (J. of Phys. Chem. 26, 845, 1922) state that the taking up of dyes is a case of adsorption and that the amount of dye adsorbed varies continuously with a change in the hydrogen ion concentration of the dye "bath." This is confirmed by the work of Speakman (J. Soc. of Dyes and Colorists, May, 1925, p. 172) and of Scott (American Dyestuffs Reporter, Vol. XIV, 862, 1925). While much of this work has been done with wool and silk, the same holds true for paper.

Experiments on retention have been checked by measuring the amount of dye left in the bath by means of a colorimeter. Different acids such as acetic, hydrochloric and sulfuric were used and the same retention was observed with each acid, so long as the same pH value was maintained. Change in the pH value, however, caused a very marked change in the amount of dye retained by the fiber.

Sutermeister states that "the water used in dyeing operations may have a considerable influence on the results. Finely divided vegetable impurities have little effect on either colors or mordants, but inorganic impurities are much more serious. Hard water due to carbonates or bicarbonates of calcium or magnesium may cause partial precipitation of basic colors; if it is necessary to use such water for dissolving basic colors, it should be corrected by adding a very slight excess of acid, preferably acetic acid." The general subject of water softening and purification will be discussed later. The reason why acetic acid is preferable to a stronger acid in the case given above is that acetic, being a weak acid, allows much more accurate hydrogen ion control.

Coating

Another operation in which active acidity plays a very definite part is in the coating of paper. The various clays, starches, casein, etc., which are used are at least partly in the colloidal form. The action of a colloid is greatly dependent on its active acidity, or hydrogen ion concentration, as was shown in the case of glue.

The effect on the adsorption of dyes by clays is clearly shown by the work of Thies (Ind. & Eng. Chem. 17, 1165, 1925). He found that two different clays of the same chemical type did not behave similarly when compounded in rubber. One type gave good cures and high tensile strength while the other type gave slow cures and low tensile strength. He also found that these two clays had very different reactions, a suspension of the clay which gave good cures having a pH value of 7.1, and that of the clay which gave poor cures having a pH value of 4.0. It is of course seen that the latter was considerably more acid. In an attempt to differentiate between good and poor clay for rubber work, he made measurements of the adsorption of dyes by the two types of clay mentioned above. In this work he used sixteen different dyes. The adsorption of dyes by the clay which had a pH value of 7.1 was very erratic and also very low. The average retention for the sixteen dyes was 39% of the dye added. In only four cases was the retention over 50%. On the other hand, the average retention by the clay which had a pH value of 4.0 was 73%. In ten of the sixteen dyes the retention was over 90% and in seven it was 99% or over.

Thies states that "the erratic amount of adsorption exhibited by the good clay could be expected . . . as the adsorption is in some way affected by the hydrogen ion concentration; probably the different dyes at various pH values are adsorbed in different amounts by a single clay. At least it is unlikely that the clay under investigation should offer the most favorable condition for adsorption to all dyes in all cases. Gordon has shown ("Theory of Adsorption and Soil Gels," Colloid Symposium Monograph, Vol. II, p. 124) what a marked effect the hydrogen ion concentration can have on adsorption of dye using Orange II with iron hydroxide and alumina gels. Five and one-half times as much dye was adsorbed in the case of iron hydroxide at pH 2.3 as at pH of 3.2."

In addition to dyes, Thies also ran experiments with various accelerators and found that adsorption of these materials was similar to that of the dyes. In other words the phenomenon is apparently general and demonstrates the extreme importance of very accurate hydrogen ion control. Not only is the amount of dye necessary to give a definite shade or depth of color reduced, but accuracy can be obtained in matching shades.

Sutermeister states that "casein is essentially of an acid nature and hence requires treatment with an alkali to bring it into solution. It forms two series of salts, those neutral to phenolphthalein being called basic caseinates, while those neutral to litmus are known as neutral caseinates."

"The alkalis which have been proposed as solvents are ammonia and ammonium carbonate and hydroxide, carbonate, silicate, bo-

Composite view of the West Virginia Pulp and Paper Company's Mills

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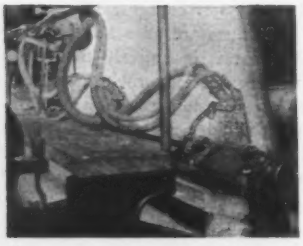

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rate, sulfite and phosphates of sodium. Of these, ammonia and the carbonate, borate and phosphates of soda are the ones most frequently used, while caustic soda is generally avoided because of its drastic action if used in excess. If care is used, however, caustic soda is one of the best solvents, being cheap, quick in action, and giving as good solutions as the more expensive solvents. The relative amounts of these alkalis required to give a neutral solution vary with the different caseins."

"In any case a considerable excess is to be avoided as it is wasteful, darkens the color and with most caseins causes a very marked thickening of the solution. The full strength of a casein is developed if the alkali used is sufficient to give a solution neutral to litmus and, while a moderate excess does not cause loss of strength, this does take place if a large excess is used particularly if the heating is prolonged. The amount of alkali required to give a neutral solution varies greatly with different caseins; with borax the range may be as great as from 7 to 18%."

Litmus, as stated before, is very unreliable, and titration would not give the desired information. By careful hydrogen ion control, however, the exact amount of alkali required can be added and caustic soda can be used instead of the more expensive solvents, without fear of making the solution too alkaline.

With reference to the use of glue in coating, Sutermeister says that "the presence of acidity in glue is of more importance than the question of fat, since in many instances the colors used are affected by the acid to such an extent as to cause serious variations in shade." This is only another example of the importance of accurate control.

Water Purification

Since water is used in such enormous quantities in the manufacture of paper, the importance of a satisfactory and uniform water supply is clearly realized. Within the past few years, hydrogen ion control has been very widely adopted in water purification work, as it has been shown that by its use not only can a uniform supply be obtained but the cost of purification can be very materially reduced. The chief steps which are dependent on this control method are softening, coagulation and after-treatment to prevent corrosion in the distributing system.

The softening process consists in precipitating calcium and magnesium from their salts, which are in solution, and replacing them with sodium.

If hard water is employed for washing sulphite pulp, there is a tendency to deposit insoluble calcium resinates on the fiber, thus making the pulp unnecessarily difficult to bleach. In the case of soda pulp, the lime salts may be precipitated as carbonate or sulphate and carry down coloring matters, which will give the same difficulty. Also water containing calcium bicarbonate, or the presence of calcium carbonate or hydroxide in the stock, is particularly bad for sizing. The presence of calcium sulphate or chloride, however, has practically no influence. Hard water also necessitates the addition of considerably more alum in the sizing operation.

This shows the advantages of using soft water. The amount of softening agent required or the efficiency of the softening agent may be determined accurately by hydrogen ion control.

As in the manufacture of paper, the point where accurate control is of greatest importance is in coagulation, which is usually accomplished by the addition of alum. Coagulation takes place most rapidly and efficiently at a definite pH value, this value being different for different waters, since it is affected by the color and turbidity of the water, the natural alkalinity, buffer action, etc. The amount of alum necessary for coagulation must therefore be determined for each purification plant, and the pH value which gives best coagulation must be maintained at all times.

Poor coagulation may be caused by an over as well as by an under dose of coagulant. As in the case of paper, actual experience has shown that an excess of alum is almost always used. Many purification plants have reduced the amount of alum used by more than one-half, by adopting hydrogen ion control. Coagulation at the "optimum" means a better filter effluent, as it eliminates practically all solvent action on the floc and the appearance of alum in the effluent. It also greatly increases the rate of filtration and therefore makes possible a decrease in the size of the coagulating basin. It also of course means that the maximum efficiency is obtained from the chemicals used.

As such large amounts of water are used in paper making, any color or turbidity in the water will probably be taken up by the paper to a large degree. This is eliminated by purification of the water so that it can have no effect on the color and other properties of the paper.

Any purification process, in which alum or acid is used, increases the acidity and thus increases corrosion. In many cases it is therefore necessary to decrease the acidity of the water by the addition of alkali after filtration. By accurate hydrogen ion control, the amount of alkali added is kept at a minimum and therefore the cost of treatment correspondingly reduced.

In addition, accurate control of the acidity of boiler feed water in the power plant is of extreme importance.

Finally the acidity of the finished paper should be checked to see that all of the various steps are being accurately controlled and that a uniform product is obtained. Aside from the importance of uniformity to the manufacturer it is only a question of a short time before many printers, etc., will include pH value as one of their specifications in the purchase of paper.

Discussion

We have shown above the necessity for very accurate control of acidity in the various steps of paper manufacture, and stated that this control cannot be accomplished by litmus tests or by titration. These methods give very erroneous results, which have caused the loss of millions of dollars each year.

The introduction of hydrogen ion control has resulted in savings which have been astounding, ranging from $1,000 to $12,000 per month to individual manufacturers. Not only does it mean a saving in money by reduction in the use of chemicals, but, what is often more important, it makes possible the production of a uniform product, where previously there was no assurance that any one run would give a product exactly similar to the one preceding.

Since the application of hydrogen ion control to industrial processes is very recent, we shall discuss the meaning of the terms and show why titration does not give reliable results.

Theory of Hydrogen Ion Measurements

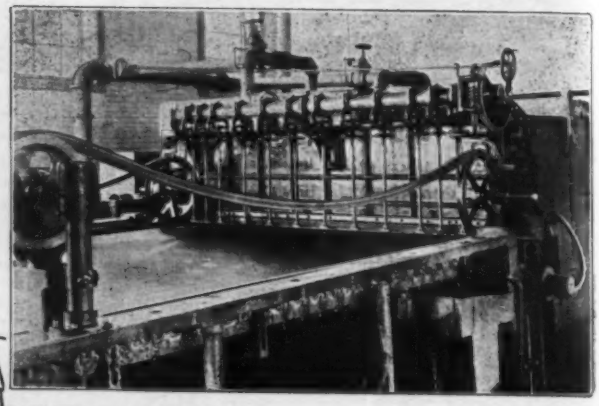
All liquids, of which water is a constituent, contain free H and OH ions. When the number of H and OH ions are exactly equal, the solution is said to be neutral. If the number of H ions exceeds that of the OH ions, the solution is said to be acid and the acidity increases as the number of H ions increases. Conversely, if the solution contains an excess of OH ions it is said to be alkaline.

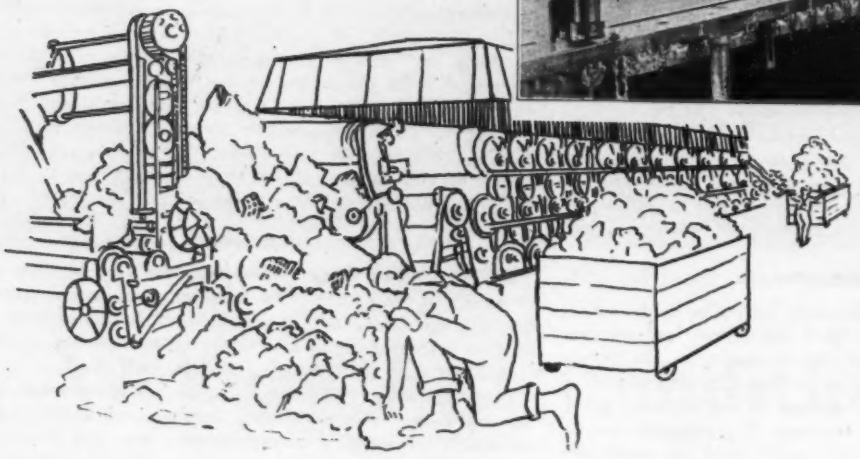
As stated above, titration gives total acidity, but does not give any measure of the *active acidity* or *hydrogen ion concentration* of a solution. By hydrogen ion concentration we mean the actual concentration of *H ions* in a given volume of solution.

We are all familiar with the old terms strong and weak acids. By strong acids we mean those which are highly dissociated in solution to give a large number of H ions. By weak acids we mean those which are but slightly dissociated in solution and therefore give relatively few H ions. For example, hydrochloric acid is a strong acid and acetic acid is a weak acid. If 10 ml. of N/10 HCl and 10 ml. of N/10 acetic acid are titrated with N/10 NaOH, using phenolphthalein as an indicator, 10 ml. of N/10 alkali will of course be required in each case for neutralization. This is due to the fact that the ionized acid, that is the free H ions, are first neutralized, and this allows more of the acid to dissociate until finally it is all neutralized and an end point

TECHNICAL SECTION, PAGE 86

A New York Mill using the Inlet operated a 206" machine continuously for three days and nights and produced 700 miles of newsprint paper without a single break. The maximum 24 hour production was 123 tons. Average machine speed 780 F.P.M.





Your copy of the Inlet Booklet is ready. Write for it. It gives full particulars regarding this patented device which lowers production costs and improves the quality of paper made on a Fourdrinier, Harper or Yankee Machine.

Broke Again!

Follow the paper from wire to presses, to driers and to calenders, to reel and to winder—weigh the broke that goes into the broke boxes and into broke holes. The problem of broke continually faces the newsprint, book, and writing paper manufacturer and they regard it no longer as a necessary evil. Broke losses in mills show a variation from 2 to 12% and sometimes more. These losses represent the difference between possible production and actual production.

Convert these losses to dollars and cents—a reduced return on your product is the result. The paper mill making a constant effort to reduce loss and waste and the mill which allows wasteful methods to continue is the difference between a successful mill and an unsuccessful one in the years just ahead.

Mechanical control over the stock is one of the contributing factors in the reduction of broke losses. It is here that the Voith Inlet plays an important part in reducing waste and lowering costs. This piece of equipment helps to eliminate foam spots and lumps. It morcover makes the sheet uniform in thickness. By making possible the use of the entire wire surface a better formation of the sheet results. Making paper under proper conditions insures less waste and quality production as well as quantity production.

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is obtained. The number of H ions in N/10 HCl is however over 60 times as great as the number of H ions in N/10 acetic acid. It is therefore readily seen that the H ion concentration is not determined by simple titration. Since it is the H ion concentration and not total acidity which is the controlling factor in the majority of chemical reactions, the importance of making H ion determinations is apparent.

A very small proportion of pure distilled water is dissociated into H and OH ions, as is shown by the fact that it will conduct an electric current to a very slight degree. By the mass law,

$$\frac{\text{Concentration of H ions} \times \text{Conc. of OH ions}}{\text{Concentration of Undissociated } H_2O} = \text{a Constant}$$

Since the amount of undissociated water is relatively extremely large, it can be taken as a constant and the above equation therefore becomes

$$\text{Conc. of H ions} \times \text{Conc. of OH ions} = \text{a Constant}$$

By electrical conductivity measurements, this constant has been found to be 1/100,000,000,000,000 or 10^{-14} at 21° C. Since in pure distilled water the number of H and OH ions are equal, each must have a concentration of 1/10,000,000 or 10^{-7}.

Meaning of pH Scale

This method of expressing H-Ion Concentration is very inconvenient and clumsy. Sorensen therefore suggested the use of the term pH, the pH value being the logarithm of the reciprocal of the hydrogen ion concentration. Thus

$$pH = \log \frac{1}{(H+)}$$

Just as an acid solution is said to be normal when it contains 1 gram of ionized hydrogen per liter, so a solution is said to be normal with respect to hydrogen ions when it contains 1 gram of *ionized* hydrogen per liter. The pH value can therefore also be defined as the logarithm of the denominator expressing the normality of H ions, such as N/10, N/100, N/1000, etc.

This method of expressing H ion concentration has now been generally adopted. In the case of pure distilled water, in which the H ion concentration is N/10,000,000 or 0.0000001, the pH value would therefore be the log of 1/0.0000001 or 10,000,000, which is 7.0. This value 7.0 is therefore the neutral point on the pH scale.

It will readily be seen that pH values below 7.0, such as 6.0, 5.0, etc., will denote acidity, the degree of acidity increasing as the numbers decrease. For example, if a small amount of HCl is added to pure distilled water, which has an H ion concentration of 10^{-7} or a pH value of 7.0 the acid will dissociate into positive H ions and negative Cl ions. The total number of H ions in the solution will therefore be greater than 10^{-7}, and the solution will therefore be acid. Suppose the H ion Concentration is found to be N/1,000,000. The pH value will be the log of 1,000,000 which is 6.0. Similarly, if the H ion concentration is N/100,000 the pH value will be 5.0, etc. It should be remembered that since we are dealing with logarithmic values, a solution having a pH value of 5.0 is ten times as acid as one having a pH value of 6.0. Similarly a solution of pH 4.0 is 10 times as acid as one of pH 5.0.

Since by the law of mass action

$$\frac{\text{Conc. of H ions} \times \text{conc. of OH ions}}{\text{Conc. of Undissociated Molecules}} = \text{a Constant}$$

it is apparent that as the H ion concentration increases the OH ion concentration must decrease, and vice versa. Even in a strongly alkaline solution there are however some H ions and, for the sake of simplicity, it is therefore advisable to express both acidity and alkalinity in terms of pH values.

From the fact that neutral water has an H ion concentration of N/10,000,000, it is apparent that an alkaline solution must contain a smaller number of H ion. Let us assume that by adding a small amount of sodium hydroxide to pure water, we decrease the H ion concentration to N/100,000,000. The pH value of this solution would be 8.0. Similarly if the H ion concentration is reduced to N/1,000,000,000, the pH value would be 9.0. This shows why all values higher than 7.0 indicate alkalinity, the degree of alkalinity increasing as the numbers increase. It should be remembered here also that a solution of pH 9.0 is 10 times as alkaline as one of pH 8.0.

It is therefore seen that the pH value is an absolutely accurate measure of the DEGREE of acidity or alkalinity of a solution. By making these determinations, definite values are obtained which can be recorded and which can be duplicated exactly at any time, by the same or different workers. We are therefore not dependent on such vague and meaningless terms as slightly acid or alkaline, moderately or strongly acid or alkaline, etc.

The exact meaning of H ion concentration and pH values can be made clear by a few concrete examples. An N/10 solution of hydrochloric acid is one which contains 3.65 g of HCl, or 0.1 g of ionizable H per liter. Electrical conductivity measurements have shown that at 18° C, 84% of the HCl is dissociated. This means that 84 molecules out of every 100 do not exist as molecules, but are split up into ions of H and Cl. The remaining 15% of course exist as molecules. If the HCl were completely ionized, there would be 0.1 gram of H ions per liter. Since, however, only 84% is ionized, we have 0.1 x 84/100=0.084 grams of H ions per liter. The normality of this solution with respect to H ions is 1/0.084= N/12. The pH value of N/10 hydrochloric acid is therefore the logarithm of 12 or 1.08.

An N/10 solution of acetic acid also of course contains 0.1 gram of ionizable H. Electrical conductivity measurements however show that at 18° C. it is dissociated only to the extent of 1.36%. Hence the hydrogen ion concentration is 0.1 x 1.36/100= 0.00136. This is equivalent to an N/735 solution of H ions. The pH value of N/10 acetic acid it therefore the log of 735 which is 2.86

We have shown above how H ion concentration and pH values are derived. In actual practice it is, however, extremely simple to make pH determinations. Two common methods are available, the electrometric and colorimetric methods. Since the electrometric methods requires elaborate equipment, and an operator with considerable chemical training, we shall confine our discussion to the colorimetric method. This method was made possible by the development of the sulphonphthalein indicators by Clark and Lubs.

The principle of H Ion measurements depends on the fact that various indicators give changes in color depending on the degree of acidity or alkalinity of the solutions to which they are added. Each indicator has its own definite pH range. On the acid side of this range the indicator is completely transformed to its "acid color," and on the alkaline side it is completely transformed to its "alkaline color." For example, Bromthymol Blue covers the pH range 6.0-7.6. If the pH value of a solution to which Bromthymol Blue is added is 6.0 or below, the indicator will show a yellow color. If however the pH of the solution is 7.6 or above, the indicator will show a deep blue color. Between these two points the color will vary from yellow to blue, depending on the pH value of the solution. Bromthymol Blue is called the neutral indicator as it covers the neutral value pH 7.0. It should therefore be used in all determinations in which absolute neutrality is required.

The various indicators with their pH ranges and color changes are given below:

Indicator	pH Range	Color Change
Thymol Blue (acid)	1.2—2.8	Red-Yellow
Bromphenol Blue	3.0—4.6	Yellow-Blue
Methyl Red	4.4—6.0	Red-Yellow
Bromcresol Green	4.0—5.6	Yellow-Blue
Bromcresol Purple	5.2—6.8	Yellow-Purple
Bromthymol Blue	6.0—7.6	Yellow-Blue
Phenol Red	6.8—8.4	Yellow-Red
Cresol Red	7.2—8.8	Yellow-Red
Thymol Blue (alkaline)	8.0—9.6	Yellow-Blue

It will be noted that Thymol Blue has a double range; acid (1.2-2.8) and alkaline (8.0-9.6). It will also be seen that since the ranges of practically all of the indicators overlap, it is possible to select an indicator to cover any desired range.

TECHNICAL SECTION, PAGE 87

6 TERRY PAPER MACHINE DRIVES ORDERED DURING JAN. 1926

THREE more American paper mills ordered Terry drives to replace their engines and motors in January of this year.

Two of these drives will be 400 H. P. units for connection to the variable speed shafts of newsprint machines. The other four will be 120 H. P. units for similar service on machines making various weights of paper, and will be equipped with 4 to 1 ratio variable speed governors.

These mills have thereby assured themselves of the same high operating efficiency and accurate speed regulation that other users of the Terry drive are securing. One of these users in commenting on the service received from his Terry unit writes as follows:—

> *"We are highly pleased with the performance of the Terry Steam Turbine which we use for driving our 166 paper machine. The speed control is perfect at all speeds of the machine. Should we put up another paper machine we would again install the Terry Turbine."*

May we submit preliminary figures on a Terry drive to meet your mill requirements?

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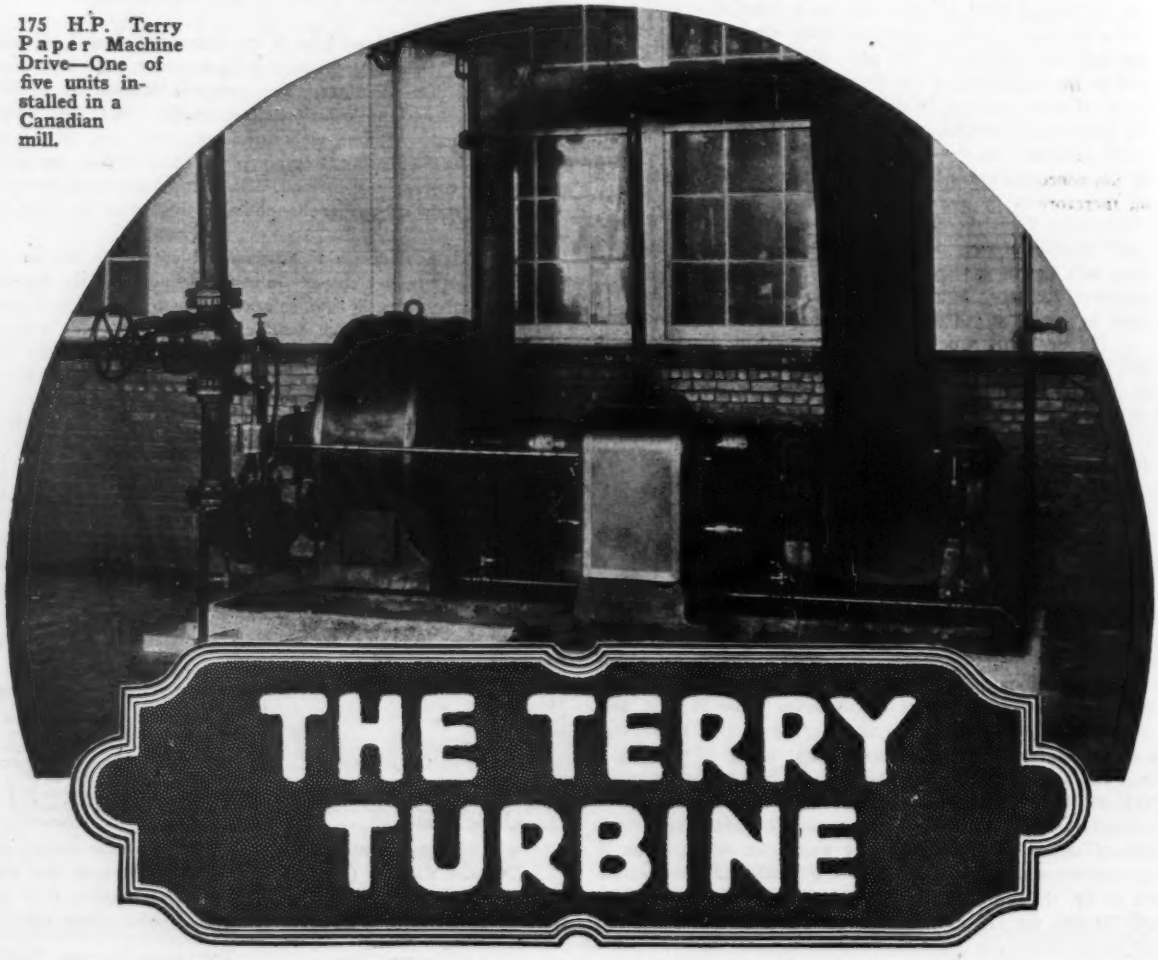

175 H.P. Terry Paper Machine Drive—One of five units installed in a Canadian mill.

"Buffer Action"

Before discussing the actual procedure for making determinations of H ions concentration colorimetically, it is necessary to explain "Buffer Action." Clark describes buffer action as the resistance exhibited by a solution to change in pH through the addition or loss of acid or alkali.

This action can best be illustrated by means of an example. Pure water, as stated above, has a pH value of 7.0. If I cc of the 1.01 Hcl is added to a liter of pure water, the pH value will be changed to about 5.0. Let us now consider a solution containing a mixture of sodium acetate and acetic acid. In this solution the dissociation of the acetic acid is very small.

$$CH_3COOH \leftrightarrows CH_3\overset{-}{C}OO + \overset{+}{H}$$

The dissociation of sodium acetate is, however, large

$$CH_3COONa \leftrightarrows CH_3\overset{-}{C}OO + \overset{+}{Na}$$

Now suppose we add a small quantity of HCl to this solution. It is immediately largely dissociated into H and Cl ions.

$$HCl \leftrightarrows \overset{+}{H} + \overset{-}{Cl}$$

We therefore have in solution ions of H, Cl, Na and CH_3COO. Acetic acid ionizes to only a very slight degree. This means that CH_3COO and H ions cannot exist together in solution to a very large extent. Therefore the larger part of the H ions from the HCl will immediately combine with CH_3COO ions to form undissociated molecules of acetic acid, and the H ion concentration or pH value of the solution will be only very slightly changed. If, on the other hand, NaOH is added to this mixture, it will react with the CH_3COOH to form CH_3COONa and H_2O. It will therefore be seen that quite a little acid or alkali can be added to a solution containing buffer salts without changing the pH value. In general, a buffer salt is a salt of a weak acid or base, such as potassium acid phosphate, potassium acid phathalate, disodium phosphate, sodium acid citrate, etc.

However, by making definite mixtures of the solutions of these salts with standard solutions of acids or alkalies, solutions of definite pH values are obtained. These are perfectly stable since, as stated above, they are unaffected by the addition of fairly large quantities of acids or alkalies, or by dilution.

Advantage is taken of this buffer action in making up color standards for measuring H ion concentration. A set of color standards consists of nine tubes. Take, for example, standards of Phenol Red. This indicator covers the pH range 6.8—8.4. Buffer mixtures, having definite pH values, are made up in intervals of 0.2 pH, that is 6.8, 7.0, 7.2, etc., up to 8.4. Ten ml. of these various buffer mixtures are placed in separate ampoules which are made of non-soluble glass. 0.5 ml of Phenol Red indicator solution, 0.02 per cent, is then placed in each ampoule, a preservative added and the ampoules sealed. The ampoule containing the 6.8 buffer mixture will have a yellow color. That containing the 8.4 buffer mixture will have a deep red color. The ampoules containing the intermediate buffer mixtures, 7.0, 7.2, 7.4, etc., will have shades ranging from yellow to red, the intensity of color depending on the pH value of the buffer mixture contained in the given ampoule. Since the solutions used are highly buffered, the ampoules are made of non-soluble glass, and a preservative is added, the color standards are permanent for about a year, if kept in the dark and away from excessive heat when not in use.

Color standards for the other indicators such as Bromcresol Green 4.0—5.6, Bromcresol Purple 5.2—6.8, etc., are of course made up in an exactly similar manner.

A word is also necessary concerning the effect of buffer salts on solutions which are being tested. If the solution is unbuffered, as is often the case with water, the pH value will change rapidly if the solution is exposed to the air or to acid or alkaline fumes. Determinations should therefore be made promptly and readings taken immediately after addition of the indicator solution.

With buffered solutions this difficulty is not met with, as from the definition of a buffered solution, the pH value will change very slowly.

Making pH Determinations

We now come to the actual determination of H ion concentration or pH value. If the worker has no idea of the acidity or alkalinity of the solution to be tested, it is best to fill a number of the cavities in a spot plate with the solution, and then add a drop of the various indicator solutions to different cavities. In this way he can determine the indicator in whose range the pH value of the solution lies. For example, fill three cavities of a spot plate with the solution to be tested. To one add a drop of Bromcresol Purple indicator solution, pH range 5.2—6.8; to a second a drop of Bromthymol Blue, 6.0–7.6; and to the third a drop of Phenol Red, 6.8–8.4. By reference to the color changes of the various indicators given in the table above, it will be seen that if Phenol Red gives a yellow or light red color, the pH of the solution will not be higher than 7.6. If the Bromcresol Purple gives a light or deep purple, the pH will not be below 6.0.

LaMotte H-Ion Comparator Set
(Improved Model)

The pH of the solution must therefore lie in the range of Bromthymol Blue 6.0–7.6. If, however, all the indicators had given a yellow color, it would be necessary to make additional tests with Bromcresol Green 4.0–5.6, Bromphenol Blue 3.0–4.6, etc., until the correct indicator was determined. If, on the other hand, Phenol Red had given a deep red color the solution should be tested with Thymol Blue 8.0-9.6. After a little practice with these indicators the worker is able to determine very easily and quickly the indicator in whose range the pH value of the unknown solution lies.

Assuming that the unknown lies within the range of Bromthymol Blue, the actual determination is made by means of the LaMotte H-Ion Comparator Set, illustrated above.

This set consists of nine color standards, covering the range of any one indicator, and one ampoule of distilled water; four graduated test tubes of the same bore and thickness, each 15 mm. in diameter; and a bottle of standardized indicator solution, which is fitted with a 0.5 ml. pipette and nipple for measuring out the indicator solution.

The top of the case, which serves as a comparator block, is removed, leaving all of the equipment in the bottom. If the liquid to be tested is clear and colorless, one of the test tubes is filled to the mark (10 ml.) with the liquid, and 0.5 ml. of the Bromthymol Blue indicator solution is added from the graduated pipette. This tube is then placed in the hole in the comparator box directly in front of the middle slot. Bromthymol Blue Color Standards, differing by 0.2 pH, are then substituted in the holes on either side of the test sample until an exact match is obtained, or until the color of the test sample lies between those of the two standards. If the color exactly matches one of the standards, the pH is read off directly. If it lies between two

TECHNICAL SECTION, PAGE 88

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consecutive color standards, such as 6.6 and 6.8, the reading of the sample is taken as 6.7.

If, however, the liquid to be tested is colored or turbid, or both, the effects of color and turbidity must be eliminated in order to obtain an accurate reading. This is done in the following manner: Three of the graduated test tubes are filled to the mark (10 ml.) with the solution to be tested, and are placed in the three holes back of the slots, indicated by the positions A, B and C below:

B	A	C
O	O	O
O	O	O
E	D	F

To the middle tube (A) 0.5 ml. of the indicator solution is added. The tube of distilled water is then placed in the hole D, in front of the tube of unknown which contains indicator solution. Color standards are then substituted in the remaining two holes E and F, these standards being changed until on looking throug the slots an exact match with one of the standards is obtained, or until the color of the sample B lies between the colors of two standards differing by 0.2 pH. The pH value of the solution is read off in the manner explained above for clear and colorless solution. By this arrangement of the tubes, any effect of color and turbidity of the solution being tested is eliminated, and results accurate to 0.1 pH are obtained.

Since the bottom of the box acts as a tube rack for the color standards continued in the set, extra sets of color standards, such as Bromcresol Purple 5.2-6.8, Phenol Red 6.8-8.4, etc., can be procured, without the case, and all measurements made in the one comparator block.

The pH ranges of the various indicators overlap, as shown by the list of indicators given above, so that it is usually possible to make determinations on any sample with sets of standards of two indicators, and thus insure accuracy in the measurement of pH values.

The range which is required in pulp and paper work is usually pH 4.0-8.4. This range is covered by the four indicators: Bromcresol Green, Bromcresol Purple, Bromthymol Blue and Phenol Red.

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Wagner Stationary Recovery Furnace

For Soda and Sulphate Mill Chemical Recovery

By C. L. Wagner *

This furnace, as its name implies, is a stationary shell with refactory lining, designed to take the place of and eliminate the costly and inefficient units, which in soda plants are composed of rotaries and leachers and in sulphate mills, of rotaries and smelters, with or without disc evaporators.

History

The idea leading to the development of this furnace grew from observation of the gases and odors leaving recovery plant chimneys and a view of the piles of leached carbon coming from the process.

When the rotary work was watched, it was at once apparent and further investigation demonstrated, that it was analogous in every respect to chain grate stoker operation, provided the coal were fed into the rear end and moved forward into the fire, subject to contact only with an atmosphere free from oxygen and loaded to capacity with carbon dioxide.

In both cases the result will be similar.

First, water is driven off.

Second, volatile combustibles are driven off.

Third, coke in one case and black ash in the other, is taken out at front end of stoker or rotary.

This process as carried out was one of destructive distillation and only where air leaks in are some of gases and carbon burned.

Do not forget that considerable fuel is required to maintain this roasting or destructive distillation temperature.

Tests of the gases leaving the rotary and the presence of numerous small feather flames, where air leakage occurred, proved the presence of highly combustible gases, requiring only proper conditions to produce an intense heat. The evidence of volatile combustibles in relief gases from digesters and evaporators, as well as from incinerating black liquor was known before this, occurring in similar manner in wood charcoal plants.

The black liquor contains the parts of the wood having highest fuel value.

Experiments were made in spraying liquor into rotaries, in the endeavor to do away with fuel and were finally successful, though the conclusion arrived at finally was that a rotary was not necessary and was an exceedingly fine way to burn fuel wastefully.

The returns in steam on rotary spraying were so good, however, that it appeared probable that with better control, very large steam values would be secured.

The temperatures secured in the rotary were so high as to be destructive to linings and we secured steam yields in excess of 6,000 pounds per hour from 500 gallons of liquor and no additional fuel. Our flowmeter pen went over the edge of chart and both pop valves on the boiler were operating constantly.

It was decided to build a stationary furnace, having in mind the constants and principles learned in rotary work.

The Wagner Furnace

This furnace, which was of small dimensions and had a maximum capacity of 150 gallons of 35 degree Be. liquor per hour, was at once successful on straight soda liquors and mixture having the character of sulphate liquors. Its operation was very simple and easy and composition of gases subject to minute regulation. Oil was used for preheating the furnace.

The furnace, in commercial size is now on the market and the P. H. Glatfelter Co., at Spring Grove, Pa., was the pioneer in its use. This furnace was designed for a capacity of 500 to 800 gallons per hour, to operate on jack pine soda liquor.

Heat balances made on this liquor, indicated a 400 hp. boiler, to produce 12,000 pounds steam at 150 pounds pressure, would be required, with dust chambers and possibly a washing of gases leaving the boiler.

The installation was made with a 40 ft. long breeching, to connect to a 200 hp. porcupine boiler, attached to a rotary, leaving the rotary in place. This was for a test only, where size and type boiler were to be determined and then installed.

* Assoc. Mem. TAPPI; J. O Ross Engineering Corp., New York, N. Y.

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While some troubles were encountered, they were not serious and have been gradually eliminated. On the face of the results, with complete equipment as planned, we have no reason to suppose that our claims as to recovery of 98 per cent of soda going to furnace, will not be fulfilled.

The temperatures of gases going to the boiler are from 1,900 to 2,200 deg. F. and most of soda which may be carried over (but should not be) will deposit as melted soda or dust, and be automatically and continuously removed.

A gyro gas scrubber is a standard part of equipment.

Operation

The furnace is preheated by means of oil, gas or wood and when the soda fusing point is reached, liquor is sprayed in through the top of the furnace, by means of an air nozzle. No preheating of liquor is done, liquor from evaporators being used at 160 to 170 deg. F.

The gases distilled off in passing through the upper zone, at once take fire and the oil nozzle is at once removed. The carbon burns out when it reaches the bottom and molten soda at once flows out into the dissolving tank, going into immediate solution. No difficulty is found in keeping soda flowing freely.

Gas tests will indicate the volume and distribution of air. In soda, an excess is not harmful, but in sulphate, a careful regulation is required.

Construction

The furnace consists of a vertical steel shell, having an upper and lower section, which may vary in diameter.

The lining is soapstone or chrome brick with a flat suspended arch for top. The two zone linings are supported independently of each other.

An air space is provided between lining and shell, which serves to preheat the combustion air and prevent overheating of lining.

Means for supplying air for combustion, for atomizing, for supplying draft and washer or scrubber, with recording CO_2 meter, are standard parts of the installation.

Boiler: Any type of boiler may be used, though we recommend a vertical water tube type, with tubes not too closely spaced.

Heat Results

In addition to the saving in fuel and steam used in leaching, we should get as follows:

100 tons soda pulp basis =
500 gallons liquor 35° Be. will yield in furnace—
500 gal. = 12,000 lb. steam
50,000 gal. = 1,200,000 lb. steam

Steam Use

Cooking, three pounds average per pound pulp:

200,000 lb. pulp × 3 lb. steam = ...	600,000 lb. steam
Evaporation not to exceed ..... = (Max. at 20 lb. pressure)	490,000
Causticising	60,000
Bleaching—wet process	200,000
	1,350,000 lb. steam

With the use of indirect heating, for which a new heater has been designed, the evaporation steam will drop to 300,000 or 350,000 pounds.

As bleach steam and evaporation may both be bled from a turbine in which high pressure steam from the boilers is used, power may also be derived and the pulp mill will be practically independent of outside fuel.

In the sulphate process, heat values are lower by a small percentage, due to two causes:

1. Lower percentage of wood material in solution and higher saline content of liquor.

2. Reduction of sulphate and sulphite to sulphide, this being an endothermic reaction which absorbs some heat.

While up to per cent of the gross heat value may be obtained as steam with soda liquor, not to exceed 54 per cent can be obtained at present with sulphate liquor.

It must also be remembered that approximately 1,000,000 B.t.u. plus are lost from each ton of pulp, due to relief gases and evaporation loss in volatiles. This is in addition to washing and furnace losses.

Report of the Committee on Abstracts and Bibliography

Clarence J. West,* Chairman

During the year 1925, there appeared in the columns of the Technical Section of the PAPER TRADE JOURNAL the following contributions from the Committee:

Abstracts, 29 pages in volume 80 and 48 pages in volume 81, a total of 77 pages as compared with 78 for the year 1924.

The annual bibliography of paper making for 1924, reprinted in the Technical Association Papers, (Contribution No. 45).

A list of publications of the Paper Section of the Bureau of Standards (Contribution No. 46 with B. W. Scribner).

Waste Liquors and Waste Gases

A translation of a compilation of patents on the utilization of waste gases and liquors, by A. Schrohe, which was augmented by about an equal number of patents by the Chairman (Contribution No. 47); this translation with complete indexes will appear in the forthcoming Technical Association Papers.

Indexes to the Technical Section for volumes 80 and 81.

A number of technical articles have been translated from thte French, German and Russian.

While no record has been kept of the number of requests received and answered during the past year, it would seem that there is an increasing interest in the abstracts published in the Technical Section. Numerous requests have been received for photostat copies of articles in foreign and domestic journals, and, as far as possible, these have been furnished.

Collective Bibliography

The Committee has definitely undertaken the preparation of a collective bibliography of paper making from 1900 to date. The several thousand cards which have been accumulated by the Chairman have been thrown into groups by journals, and the work of verifying the references and their classification has been started. Since this means a page by page search of every volume published, the time which will be necessary to complete this task is necessarily considerable. The speed with which the work progresses must depend upon the time which can be given it by the Chairman. Unfortunately, this is not as much as he would desire. However, the work will be pushed as rapidly as possible, and it is to be hoped that, upon or before its completion, the Technical Association may find a method by which its publication may be financed.

* Associate Editor, International Critical Tables, National Research Council, Washington, D. C.

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Identification of Piping Systems

By P. H. Glatfelter* for Heat Light and Power Committee

At the fall meeting of this association, held in Kalamazoo, it was decided to have a representative of the Technical Association of the Pulp and Paper Industry prepare a preliminary code covering the association's requirements relative to adopting some sort of code for piping identification.

It was also suggested that the code submitted by TAPPI should conform with the work already done by the ASME, in that the paper industry requirements cover so small a field compared to that covered by the ASME.

Therefore, the purpose of this paper is to bring to the attention of the pulp and paper industry the importance of adopting some sort of code.

As far back as 1911, the American Society of Mechanical Engineers started working on a code, and in June, 1922, at a joint meeting of the National Safety Council with the American Engineering Standards Committee, a special committee was appointed, consisting of thirty-two members, representing thirty technical societies and industrial organizations. The work of this committee was divided into the following sub-committees:

1—Committee on Identification by Color;

2—Committee on Markings Other Than Color;

3—Committee on Classification.

These three committtees then met with the Executive Committee in December, 1923, when Report of No. 1 Committee was submitted; report from No. 2 Committee, November, 1924; report from No. 3 Committee, December, 1924. These reports were carefully and fully discussed, and later balloted and unanimously adopted.

They are as follows:

(Illustrations omitted. Complete report may be obtained from ASME.)

Code for the Identification of Piping Systems—Identification by Colors; Identification by Markings Other Than Color; Classification. Sponsor Organizations: National Safety Council; The American Society of Mechanical Engineers.

Purposes of Standardization

Piping color schemes have been worked out by a large number of plants, both commercial and institutional. Generally speaking, the standards arrived at in individual cases have given satisfaction to those using them. They suffer, however, from complete lack of uniformity, and in particular there is no universal differentiation of designation between pipes containing materials safe to handle, and those unsafe. As the result of these conditions, spontaneity of action in time of emergency is lost, particularly when outside agencies, such as fire departments, are called in to assist. In addition thereto, there is present a confusion in the minds of those changing from one industry to another, which takes an appreciable time to train out. Also a number of plants, desirous of having an identification scheme, have failed to install one because of the inability to discover any generally accepted standard, or lack of knowledge as to which paints were able to withstand the peculiar heat or chemical conditions met with in the particular case. Because of these conditions an opportunity is afforded to obtain by standardization an increased safety to human life and an increase of practical efficiency in plant operation.

Requirements of a Standard System for Identification of Piping Systems

The principal requirements are:

(a) Distinguishability. The system must provide a method of identification by means of which any fluid may be quickly, easily and accurately distinguished from the others under all conditions of plant operation.

(b) Flexibility. The system must be sufficiently flexible so as to allow for increases and changes in the field of any one plant, or of industry as a whole.

(c) Inclusiveness. The system must include designations for all materials to be found, otherwise those excluded will result in a group of the "neglected," which naturally tends to grow, and the possible deterioration of the whole system results.

(d) Simplicity. Simplicity is a great aid in obtaining universal acceptance. The most potent reason for abandonment in a plant of a comprehensive color scheme is its increase of complication.

(e) Practicality. The colors and symbols suggested must be distinguishable under the light usually found in plants, the colors recommended must be obtainable in the open market at not too great cost and they must stand up under plant conditions of heat and chemical fumes, etc.

(f) Rationality. Although empirical systems frequently last, a rational system has an increased chance of ready and full acceptance, and of a long life as a standard.

The standard approximates as closely as the present state of the art permits to these six prerequisites. It is, therefore, hoped that industry as a whole will gradually adopt it, even though it is recognized that the supplanting of present systems, and the extension of the new, is a matter that must, of necessity, be accomplished gradually. The advantages of the code will become apparent on study of its detailed provisions. It will be noted throughout that the standard leaves the maximum of freedom of action to the individual plant, only prescribing that certain already well understood conventions in other lines used to indicate danger, such as the orange groups of colors, shall be confined to that purpose in all plants. Further, a general system is presented which the individual plant may subdivide in as much detail as it believes best suits its needs.

Limitation of Scope

This code is confined to the code of identification of piping systems in industrial and power plants, not including pipes buried in the ground.

Definitions

PIPING SYSTEMS, for the purpose of this code, shall include in addition to pipes of any kind, fittings, valves, pipe coverings. Supports, brackets, or other accessories are specifically excluded from applications of this standard. Pipes are defined as hollow conduits for the transport of gases, liquids, semi-liquids, or plastics, but not solids. Electric conduits are specifically excluded from the provisions of this standard.

By POWER PLANT is meant any plant producing any of the following substances: Steam, gas for heating or lighting purposes, electricity, compressed air, vacuum, water pumping, refrigeration and ice, air conditioning, but not including plants for the production of various chemicals or in which operations are performed for other purposes than the transfer of units of heat from one form into another more readily usable form. Power Plants specifically include heating plants.

Identification Classifications

While it is practically impossible to outline an acceptable code in which every product likely to be transported would have its identification by special color or symbol, it may be stated, after investigation, that any materials transported in pipes in a plant fall in one of the following general classifications:

(a) Safe Products. These products may be defined as having no hazard in their handling and no extraordinarily high value, so that a workman in approaching a piping system to make repairs will run no undue hazard in breaking into a pipe bearing a safe material, even though that material had not been emptied by previous arrangement.

* Member TAPPI; Secretary, P. H. Glatfelter Co., Spring Grove, Pa.

TECHNICAL SECTION, PAGE 91

MOSINEE

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(b) Extra Valuable Materials. These might be classified as a part of the safe materials above mentioned, but where these products have a very high value, it is preferable to give them a separate major classification.

(c) Dangerous Materials. These materials are those which are in themselves hazardous to life or property by virtue of being easily inflammable or productive of poisonous gases or are in themselves poisonous. They include materials that are known ordinarily as fire producers and explosives.

(d) Protective Materials. Under this class fall materials which are piped through plants for the express purpose of being available to prevent or minimize the hazard of the dangerous materials above mentioned. Thus, a plant may have certain special gases which are antidotes to poison fumes, piped through its shops for the express purpose of opening or breaking the pipe in case of danger.

(e) Fire Control Equipment. This classification includes sprinkler systems and other fighting equipment.

General Plan of the Code

The general plan of the code may be summarized as follows:

All materials are assigned to one or other of the five classifications given above. To each classification corresponds a given main color, as set forth in Part 1 of the Code.

Individuals within each group are differentiated sometimes by shades of color, always by a system of markings in which symbols have been discarded, and a system of lettered legends is always employed, as set forth in Part 2.

Part 3 classifies materials likely to be transmitted through pipes into one or other of the five foregoing classifications.

PART 1
IDENTIFICATION OF PIPING SYSTEMS BY COLORS

Basis of Color Scheme

The basis of the color scheme employed is the color spectrum. The spectral hues are arranged in their natural order in the form of a circle. This circle is divided into five sectors, each sector or spectral region representing one of the five major classes of the classification, and capable of subdivision where necesssary into a larger number of hues, having approximately similar dominant wave lengths, but disinguishable from each other very readily under favorable illumination.

Material Classifications and Corresponding Colors

The five main classifications of materials in this standard, with the colors assigned to them, are shown in the following table:

Material Classification	*Fundamental Color*	*Color Range on Spectrum*
(A) Safe products	Green	Yellow-green to blue-green
(B) Extra valuable material	Purple	Purple to purple-red
(C) Dangerous materials	Yellow	Orange to yellow-green
(D) Protective materials	Blue	Blue-green to blue-purple
(E) Fire control equipment	Red	

Red has been assigned to *Fire Equipment* because of immemorial custom.

Yellow has been assigned to *Dangerous Materials* because yellow is the traditional color of quarantine flag, and because the yellow region of the spectrum has the highest visibility and therefore can be seen at the lowest illumination. The assignment of the other three sectors follows in natural order.

Rules for Use of Color Schemes

1. Any substance whatsoever must be assigned to one of the five major groups according to its properties or relationships to the other groups and in accordance with Part 3 of this standard.

2. The differentiation of individuals of the same major group may be accomplished sometimes by variation in the shade of color in accordance with diagram, and at all times by the special markings recommended in Part 2 of this standard.

3. No type of paint or other suitable colored coating is excluded. The selection of coatings comes under the jurisdiction of the supervising engineer or persons in authority and may be made to meet the diverse requirements of each case. All that the standard requires is that the dominant hue shall fall unmistakably within one or the other of the five spectral regions.

4. Colors which have a total reflective value too low to permit ready differentiation at minimum illumination are excluded. Median gray, which from the physiological or visual standpoint is situated about half way between white and black, reflects approximately 25 per cent of the incident standard white light and is near the permissible limit of reflective value for poor illumination. The permissible limit of reflective value is provisionally established at 19 per cent.

5. An ordinary flash lamp may be used as the arbitrary measure of minimum illumination.

Discussion of Pigments and Paints

It is impossible to select five or six indestructible pigments and have paints made from these only, because: 1, resistance to attack is limited by the vehicle as well as by the pigment; 2, there are few substances that are equally immune to all the various forms of attack; 3, the commercial availability of the materials from which practical and economical paints can be made is by no means a negligible factor.

It is necessary not to lose sight of some important facts in economical paint production, facts which have heretofore taken a paramount position in the painting of iron and steel where the protection against corrosion has been of equal or greater importance than the color of the coating. Black for instance has been widely used, not only because it may be made at a low price, but also because it is practically the only paint that will withstand elevated temperatures without discoloration, has a relatively longer life under direct exposure to sunlight, and in the form of asphaltic varnish is proof against all acids, alkalies, and sulphur compounds even in relatively strong concentrations. It is the ideal paint for pressure steam pipes but in most modern plants such pipes are insulated by various kinds of coverage, mostly white or nearly so and in general not in need of any kind of paint. Such pipes may still be painted black as protection against corrosion and the covering is best marked for identification as recommended in Part 2.

The so-called metallic browns and other types of red oxide of iron have also been very largely used in low priced anti-corrosive paints. While the reflective value of the higher qualities of Venetian red is 19 per cent or better, the darkershades run somewhat lower, and for this reason we believe the dark browns may be excluded from the system with less sacrifice than attends any attempt to retain them.

Aluminum paints also are very useful in many cases and the Committee suggests their use for extra value materials. According to the system our valuable materials fall in the purple sector but there seems to be no inherent obstacle to including the aluminum in this class if we let it represent something of very extraordinary value.

Gold bronze powders are of no especial value and may be omitted without economic loss, but if included for any special reason would fall in the yellow or dangerous sector.

The original conception is still available, of course. Grays of any reflective value can be produced economically and as resistant to attack as any of the chromatic colors.

A very useful vehicle in paints of all colors is the highly resistant China wood oil varnish, more particularly useful for interior exposure where greater resistance to moisture than is afforded by ordinary linseed oil paint is desirable. The paints will withstand temperatures up to 200 degrees Fahr. for a reasonable time and except the reds, temperatures even higher than 200 for a shorter time. For exterior exposure linseed oil will probably continue to be the most economical all round vehicle, but the system at all times permits any available vehicle best adapted to the prevalent conditions at any plant.

Obviously the identification and safety features of this code do not depend upon the painting of the entire surface of the pipes of

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PIQUA, OHIO

a given system according to the color schedule which it lays down. In many cases and for many reasons it will probably be found desirable to paint all the pipes of an installation one uniform color even though it is made up of a number of independent systems. Uuder such circumstances the valves and certain of the fittings may be given the standard color and in addition bands of the color may be placed at certain intervals along the pipe, particularly under the lettered markings recommended in Part 2 of the code.

Description of Color Samples

The samples in Fig. 3 (omitted), are not to be considered as covering the entire range of colors available, but are merely examples illustrating the means at our disposal for meeting the more usual types of abnormal exposure conditions.

A plant atmosphere that will ordinarily support human life without material danger to general health, may at times be charged with gases or vapors that will react chemically on many pigments with a resultant change in color.

By far the most common of these abnormal forms of attack come from vapors that are acidic, alkaline, or sulphureted. The dry gases are far less active but when accompanied by aqueous vapor they penetrate the paint film, and, if reactive with the pigment, cause rupture of the film and change of color by the formation of new compounds having a different volume and color from the original pigment.

If the vehicle is sufficiently resistant it may delay such action for a longer or shorter time according to circumstances, but no paint vehicle now known is wholly impervious to osmotic penetration of this kind. In any plant, therefore, where such abnormal conditions persist, the first step is to use a vehicle having the highest practical water resistance and then select colors in such a way that the pigment will have the least reactivity with the prevailing gas. The colors shown here indicate some of the possibilities in this direction.

No. 1.—Toluidin Red. Fairly fast to aqueous acids, alkalies and sulphur. An organic pigment that will stand up as well as the vehicle. Adds materially to the life of varnish vehicles and works well with all of them.

No. 2.—Paratranilin Red. Similar to the toluidin and considerably cheaper, but owing to a slight solubility in the vehicle it has a tendency to stain up through light shades or whites applies over it, e. g., white letters or aluminum stripes.

No. 3.—A mixed pigment consisting of an organic red similar to toluidin mixed with zinc yellow. Fast to alkalies and sulphur, but not to acids. Shade of orange may be adjusted to suit. Mixed with cadmium yellow in place of the zinc yellow it becomes fast to acids as well.

No. 4.—Orange Chrome Yellow. The regular color for ordinary use. Fast to alkalies but not to acids or sulphur.

No. 5.—Yellow Ochre toned up with bright yellow to a type commonly known as Golden Ochre. Ochre itself as compared with the more highly saturated hues is little more than a yellow brown, but in the proposed system where browns as distinctive colors are eliminated the ochre falls unmistakably in the yellow sector. Owing to its general stability and low price it is the main reliance for fast yellow in situations where Chrome Yellows cannot be used. Like other iron compounds that contain hydroxyl groups or "chemically combined water," it is not wholly fast to sulphur. Strong ammonium sulphide darkens it somewhat but except in extreme cases it is fast to everything. When toned up to a brighter shade, the resistance depends on the kind and quantity of toner.

No. 6.—Cadmium Lithopone, a combination of cadmium sulphide and blac fixe. Fast to everything, but applicable to extreme cases only because the available supply is limited and the cost relatively high.

No. 7.—Chrome Yellow L. The ordinary pigment for general use. Fast to acids but not to caustic alkali or sulphur.

No. 8.—Chrome Oxide toned up with a little yellow to raise its total reflection value. This oxide is a moderately low-priced oxide not to be confused with Vert de Guignet a much more brilliant and expensive quality. It is fast to everything and useful in extreme cases.

No. 9.—Ordinary Chrome Green Light. Fast to weak acids but not to alkali or sulphur.

No. 10.—Prussian Blue tint with a base white of Titanox. Fast to acid, fairly resistant to sulphur, easily affected by alkali.

No. 11.—Ultramarine Blue tint with base white of Zinc Oxide. Fast to alkalies and sulphur but not to acids.

No. 12.—Base white of Titanox tinted with Alizarine Purple. Fast to everything. Shade can be adjusted by adding Alizarine Red in varying proportions.

No. 13 and 14. A gray and a black. Included for comparison and incidental interest.

For ordinary outside exposure linseed oil is the most durable vehicle. Where higher resistance to water is required and for interior use China wood oil varnishes may be used to advantage. Where both these vehicles fail some type of coating other than ordinary paint must be selected or the identification by color abandoned.

PART 2

IDENTIFICATION BY MARKINGS OTHER THAN COLOR

Rules for Markings

1. The form of identification marking shall consist principally of a lettered legend, abbreviated or otherwise, naming the material carried in the pipe line.

2. The use of symbols or hieroglyphics must be discarded.

3. Where a knowledge of fluid flow may be of service, it is suggested that arrows be painted on the pipe.

4. Where pipe lines are located some distance above the normal line of the operators' vision, that the lettering should be placed below the horizontal center line of the pipe as shown in the accompanying sketch, Fig. 4. This sketch shows a group of pipe located near a wall. It is desirable, where the view is unobstructed, that the lettering employed be stencilled on the two lower quarters of the pipe covering rather than one side only. The lettering in the position shown will be less likely to be obscured by dust collection or mechanical damage.

5. In certain types of plants it may be desirable to label the pipes at junction points or points of distribution only, as suggested in Fig. 5. In certain existing power plants the markings are repeated at intervals all along the pipe line. In any case, the operating man should decide the location and number of signs required in each particular system of piping.

6. The type and size of letters and numbers should be of standard form easily obtained from any stencil manufacturer, ranging in height from ½ to 3½ inches as shown in Figs. 6 and 7. For pipes smaller than ¾ inch in diameter requiring identifying marks, a metal tag with the lettering etched and filled in with enamel may be used.

7. Fig. 8 gives a tabulation and a diagram of suggested heights of letters for different outside diameters of pipes or pipe coverings.

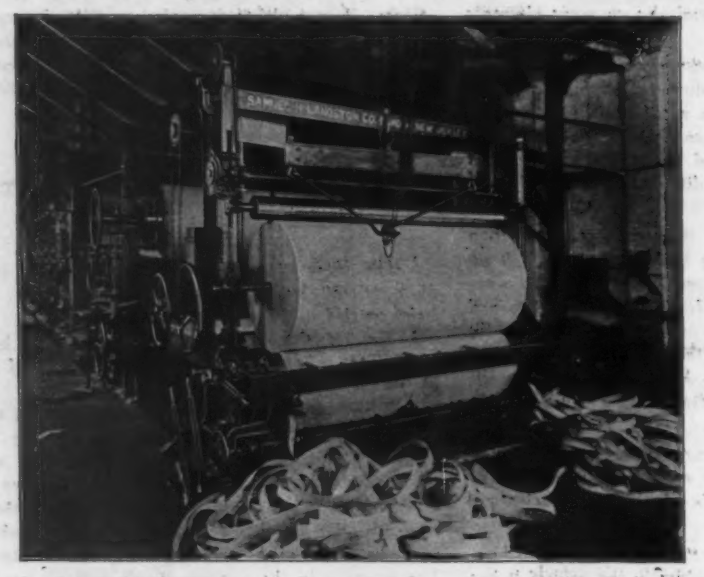
8. With regard to visibility, the eye as a matter of habit is most accustomed to the reading of black letters on lighter backgrounds. Black letters should therefore be either stencilled or painted on a rectangular background about as shown in Fig. 9. The color of the background and the nature of the material used may be that as deemed suitable for the purpose.

PART 3

CLASSIFICATION OF MATERIALS

The attached list of materials is incomplete, but includes all material which came to the attention of the committee. Materials

The LANGSTON
SLITTER and WINDER



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HERMAN GOETTSCH
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T. W. & C. B. SHERIDAN
London, E. C. 1

have been classified in accordance with the classification scheme set forth in the introduction to the standard for the Identification of Piping Systems.

Material Piped	Physical state (gas, liquid, semi-solid or a solid carried in air or gas)	Temp. of material in °F. (usual maximum)	Pressure in lb. per sq. in. (usual minimum)	or	Vacuum in inches of mercury or water	
Acetic acid	Liquid	Normal	30		28 in.	C
Alcohol	Liquid	Cool				B
Amyl acetate	Liquid	Cool				B
Alum solution	Liquid					A
Acetylene gas	Gas	0 to 200	½ in. to 250 lb.			C
Benzol	Liquid	Cold	Up to 80			C
Brine	Liquid	Cold	About 60			A
Butyl alcohol	Liquid	Cool				B
Bleach liquor	Solution					
Bisulphite liquors	Liquid					C
Blau gas	Gas	0 to 200	½ in. to 250 lb.			C
Compressed air	Gas	80	300 (in special cases 3,000 lb.)			A
CO_2	Gas and liquid	—30 to —100	0 to 250 lb. per sq. in. gage			C
Caustic soda	Solution					C
Chlorine	Gas, liquids & solutions					C
Carbon bisulphide	Gas and liquid					C
Chloroform	Gas and liquid					C
Carbon tetrachloride	Liquid					C
Coal gas	Gas	0 to 200	½ in. to 250 lb.			C
Dyes	Solution	Usually cool				C
Fine gas or waste heat gas	Gas	0 to 200	½ in. to 250 lb.			C
Foamite	Liquid	Cold	Up to 100			D
Glycerine	Liquid	Hot and cold	Up to 60			A
HCl	Liquid	Up to 80	2-10			C
Hydrogen	Gas					C
H_2S Vapor	Vapor	0 to 150	½ in. to 100 lb.			C
Intermediates	Solution	Usually cool				C
Lactic acid	Liquid	Normal	60		22-20 in.	B
Mixed acids	Liquid	Normal	30-80			C
Misc. solvent	Liquid	Cool				B
Mercury	Gas and liquid		29 in. to 100 lb.			C
Muriatic acid	Liquid					C
Natural gas	Gas	0 to 200	½ in. to 250 lb.			C
Nitric acid	Liquid	Normal	10			C
Nitro bodies	Liquid	Cool	Up to 40			C
NH_4HO_3 (molten)	Liquid		None			C
NH_3	Liquid and gas	—30 to 100	0 to 250 per sq. in. gage			C
N_2O & H_2O_3 vapor	Vapor	0 to 150	½ in. to 100 lb.			C
Oils (petroleum)	Liquid	Below 580	Below 1200			C
Paper sizing solutions	Liquid					A
Pitch gas	Gas	0 to 200	½ in. to 250 lb.			C
Producer gas	Gas	0 to 200	½ in. to 250 lb.			C
Pyrox, compounds	Liquid	Up to 80				C
Paint	Liquid	Cold	30			B
S/A	Liquid	Up to 180	30-80			C
Soda ash sol.	Liquid	Cold	60			A
Sugar juices & syrups	Liquid	195 to 200	0 to 50			A
Steam	Vapor	Below 212	Below atmos.			A
Steam	Vapor	212 to 800	Above atmos.			C
SO_2	Gas and liquid	—30 to 100	0 to 250 per sq. in. gage			C
Sulphur chloride	Gas and liquid					C
Turpentine	Liquid	Cold	Up to 80			B
Toluene	Liquid	Cool	Up to 40			C
Tar	Liquid					C
Varnish		Cold and hot	30			B-C if hot
Vapors of valuable materials not otherwise specified	Vapor	0 to 180	½ in. to 100 lb.			C
Water	Liquid	Below 150	Any pressure			A
		Above 200	Any pressure			C
Water gas	Gas	0 to 200	½ in. to 250 lb.			C

The foregoing information should be given serious consideration by all our mills.

Pulp and Paper Mills

In order to get this code into form, we have endeavored to cover the various pipe lines generally found in pulp and paper mills, assigning a color code to conform as near as possible to that suggested by the ASME.

Suggested General Piping Code for All Mills

STEAM—

High pressure—	Saturated	100 lb. and higher	—white
	Superheated		—white-gray
Low Pressure—	Saturated	20 to 75 lb.	—white-black
	Superheated		
Low Pressure—	Saturated	Atmosphere to 20 lb.	—white-green
	Superheated		

Vacuum Lines—Atmosphere to 1 in. absolute—white-buff

WATER—

Fire Protection	—red
Fresh	—green
Circulating	—green-blue
Boiler feed	—green-black
Blow off	—green-brown
Make up	—green-gray
Treated	—green-yellow
Filtered	—green (F)
Waste or white water	—green-white
Hot	—green (H)
Wash	—green (W)
Return condensate	—black (C)
Hydraulic Piping	—High pressure—green-red Low pressure—green

NOTE

All water lines should use color Green. If all the different water lines are to be marked, we suggest using Green as the predominant color with other colors for identification.

AIR—

High pressure—50 to 125 lb.—black-white
Low pressure—Atmosphere to 3 lb.—black-white

CLAY, ALUM, SIZE—

Alum—buff
Size —brown
Clay —gray-white
Color —light-green

GROUNDWOOD PULP—

Grinder pressure—	Water supply	—green
	Oil supply	—orange
Slush Stock—	No. 1 Grade	—brown (gray flanges)
	Tailings	
White Water—	Low pressure	—maroon (white flanges)
	High pressure	—maroon (green flanges)

SULPHITE PULP—Gas—Lead or cast iron—Distincitve in itself—purple
Acid—Lead and bronze—Distincitve in itself—purple-red
Blow off—Obvious —black
Waste liquor—Obvious unless reclaimed —purple-black
White Water—Low pressure—maroon (white flanges)
High pressure—maroon (green flanges)

Sulphite Brown stock	—gray-brown
Sulphite Unbleached	—gray
Sulphite Bleached	—gray-white
Chlorine gas	—yellow
Milk of lime	—olive-white
Bleach	—yellow-white

SODA PULP—

Caustic liquor—Strong	—brown (red flanges)
Caustic liquor—Weak	—tan (red flanges)
Carbonate liquor—(Green)	—brown-white
Strong black liquor	—brown-black
Weak black liquor	—brown-gray
Brown stock	—brown-buff
Unbleached stock	—brown-gray
Bleached stock	—brown-white
Sludge (lime mud)	—olive

SULPHATE PULP—
(Same as Soda Mill)

STRAW PULP—
Milk of lime—olive

OLD PAPER—

Bleach liquor	—yellow-white
Soda ash	—brown-red
Defibered stock	—black-gray
Unbleached stock	—black-brown
Bleached stock	—gray-green

CONVERSION—

Slush —gray-tan
Paper stock —gray-yellow
White water, Couch pit stock, Broke stock —green white

Upon investigation, we find that some of the pulp and paper mills have already adopted certain painting schedules for their mill buildings (exteriors and interiors), and some have also adopted a code for painting the various pipe lines throughout their mills.

The adoption of a color identification code for your mill piping will prove a valuable time-saver, not only in the tracing of a certain line, but will be a great aid in case of emergencies. A valve or fitting painted a distinctive color is unmistakable and distinguishable at a glance.

TECHNICAL SECTION, PAGE 94

SHEAHAN PATENT PAPER CARRIER

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No Slack Paper on Dryers

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International Paper Company	25	Machines
Paul A. Sorg Company	1	"
Abitibi Paper Company	6	"
Laurentide Paper Company	6	"
Frank Smith Paper Company	1	"
Wausau Sulphate Fibre Company	3	"
Crown Willamette Paper Company	16	"
Fitzdale Paper Company	2	"
St. Croix Paper Company	3	"
Crocker Burbank Company	3	"
New York & Pennsylvania Company	3	"
Kalamazoo Vegetable Parchment Company	1	"
Central Paper Company	1	"
Algonquin Paper Corporation	1	"
Great Northern Paper Company	2	"
Backus Brooks Company, Kenora	2	"
Fitchburg Paper Company	1	"
Brown Company, Louisiana	1	"
Louisiana Paper Company	2	"
Fort William Paper Company	2	"
Filer Paper Company	1	"
St. Regis Paper Company	1	"
St. Maurice Paper Company	4	"
Hawley Paper Company	3	"

And 100 Other Machines

THE BAGLEY AND SEWALL COMPANY

WATERTOWN, N. Y.

Proposed Code For Comparison of Grinders

As Developed by the Mechanical Pulp Committee TAPPI, 1925

W. E. Brawn,* Chairman

The Mechanical Pulp Committee, in endeavoring to develop a code for the comparison of grinders, feels that there is need for a common set of units by which such comparisons may be made with regard to both grinder construction and operation. The results of grinder operation are for the most part looked at from the viewpoint of amount of wood ground, power consumed, and labor used, for any particular grade or quality produced. A mill wishing to study its conditions and compare the operation of its own units one against the other, or with other mills, however, must give consideration to all of the numerous factors involved. For this reason, the code is designed to cover all the details of operation affecting production which are necessary to explain differences in the final results obtained, and to permit comparison.

Uses to Which Code May Be Put

The uses to which the code may be put are as follows:

(a) To examine and study the various conditions under which the units of a mill are operating.

(b) To compare results and conditions in one case with those of another, either in the same mill or between mills.

(c) To be an aid in planning new installations and conditions under which to operate.

(d) To compare the operation and results obtained of various types of grinders.

The most satisfactory and efficient grinder from both production and quality standpoint is not yet a settled matter, and there are various opinions on the subject. It is not necessary to give a description of the various types of grinders, because they are well known—as is also the variety of conditions under which they operate. The hand-fed pocket type is the oldest, the magazine grinder with intermittent automatic pressure control is a later development, while the magazine grinder with continuous pressure is the latest. The code is designed to cover any type of grinder in use with such factors and procedures that reflect the grinder operation. The code does not, however, include investigation of original cost of equipment, or installation costs since local conditions, power available, production required, and so on, control the size of the plant, and, to a considerable extent, the number and size of individual units.

It is further felt that many groundwood mills do not know exactly what they are doing or how they are doing it. A mill in this situation cannot very well compare its operating conditions with those of another mill, and in all probability does not know what and where its losses are; and such a mill will receive the greatest benefit from a study of its conditions and comparison with others.

The Committee does not consider that the code offered here is complete in its final form, and therefore calls it a "Proposed Code for Comparison of Grinders," until its value can be determined, and its final form decided upon.

Proposed Code for Comparison of Grinders

Grinder Data

1. Type of grinder.
2. Name of manufacturer.
3. Length of wood ground (inches).
4. Number of pockets.
5. Width of pockets (inches).
6. Total grinding area per grinder (square inches).
7. Diameter and stroke of piston (inches).
8. Normal grinding pressure in cylinders (pounds per square inch gage).
9. Pressure on wood (pounds per square inch grinding area).
10. Normal grinder speed with all pockets grinding (r.p.m.).
11. Size of pulp stones when new (diameter, inches).
12. Size of pulp stones when discarded (diameter, inches).
13. Peripheral speed, new stones (f.p.m.).
14. Speed pressures ratio (Item 13 ÷ Item 9).

Production Data

15. Prepared wood ground per day (cords, 128 cubic feet).
16. Grade of pulp produced (news, hanging, board, tissue, etc.).
17. Species of wood used (approximate percentage of each).
18. Condition of wood as to quality, moisture, how barked, etc.
19. Type of burr normally used.
20. Normal sharpenings per twenty-four hours.
21. Average grinding temperature (degrees F.).
22. Average grinding consistency (per cent).
23. Average number pieces per cord of 4-foot wood.
23. Yield of first grade pulp per cord of wood ground, including refiner output (pounds per cord).
25. Yield of second grade pulp per cord of wood ground, including refiner output (pounds per cord).
26. Total sliver rejections at grinders and bull screen per cord of wood ground (pounds).
27. Screenings per cord from screening system, exclusive 26 (pounds).
28. Material refined (pounds per cord).
29. Material wasted in white water (pounds per cord).

Power Data

30. Kind of power used.
31. Number of grinders driven by one power unit.
32. Normal grinding hp. per grinder, exclusive of auxiliaries (hp.).
33. Auxiliary hp. used per cord ground in pressure system (hp.).
34. Type of speed regulator used.
35. Type of load regulator used.
36. Type of pressure regulator used.
37. Normal speed variation from graphic record or by estimate (r.p.m.).
38. Normal load variation from graphic record or by estimate (hp.).
39. Normal pressure variation in cylinders (pounds per square inch gage).

Labor Data

40. Labor used in groundwood mill in converting prepared wood received in grinder room into pulp passing bull screen:
    a. Wood handlers (man hour per cord ground).
    b. Grindermen do.
    c. Electricians do.
    d. Oilers do.
    e. Stonesharpeners do.
    f. Foremen do.
    g. Miscellaneous do.
    h. Total man hours per cord ground.

Maintenance Data

41. Time required to change a stone.
42. Stone life in cords ground.
43. Maintenance cost per ton, of grinders only, exclusive of stones, belts, lubrication (dollars).

Resultant Comparative Data

A. Production per grinder in tons per grinder day
B. Total grinding hp. days per ton
C Man-hr. per ton ground used in grinding
D. Yield of pulp in lb. per cord (prepared wood)

* Superintendent of Research, Pilepscot Paper Co., Brunswick, Me.

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E. Total waste in slivers, screenings, and white water (lb. per cord.)
F. Stone life in cords ground
G. Maintenance cost per ton

General Remarks

Explanation of Items Shown in Code According to Numbers

6. TOTAL GRINDING AREA PER GRINDER: Area in square inches of space provided for wood to be held under pressure against the stone.

8. NORMAL GRINDING PRESSURE IN CYLINDERS: Pressure in pounds per square inch gage in cylinder under normal conditions.

9. PRESSURE ON WOOD (POUND PER SQUARE INCH GRINDING AREA): Total pressure in pounds on cylinder heads, or other pressure arrangement, divided by Item 6.

23. AVERAGE NUMBER OF PIECES OF WOOD PER CORD OF 4 FOOT WOOD: This item is included to give idea of size of wood used. Maximum and minimum diameters should also be included.

40. LABOR: The labor used to convert wood to pulp is unit of labor for grinding. Wood is taken as delivered to the grinder room storage. All labor for handling wood from grinder room wood storage to grinders is considered a part of charging grinders, whether magazine or pocket type. Any labor used to get wood from any other point to grinder room storage is not considered a part of charging grinders.

43. MAINTENANCE COST PER TON OF GRINDERS ONLY: This includes only the cost of making repairs to water wheels, motors, grinders, auxiliary grinder equipment and should cover at least a year's time—preferably more.

General:

All figures pertaining to or based on wood are on a basis of a prepared cord of 128 cu. ft.

Suggested Items

From the data obtained in the code, a number of comparative units have been suggested which could be mathematically calculated. From "Data Relating to Fifty Groundwood Mills," collected and compiled by Adolph F. Meyer, the following items are suggested:

UNIT PRESSURE = grinding pressure in pound per sq. in. of pocket area

UNIT SURFACE = number of pockets x width of pockets in inches

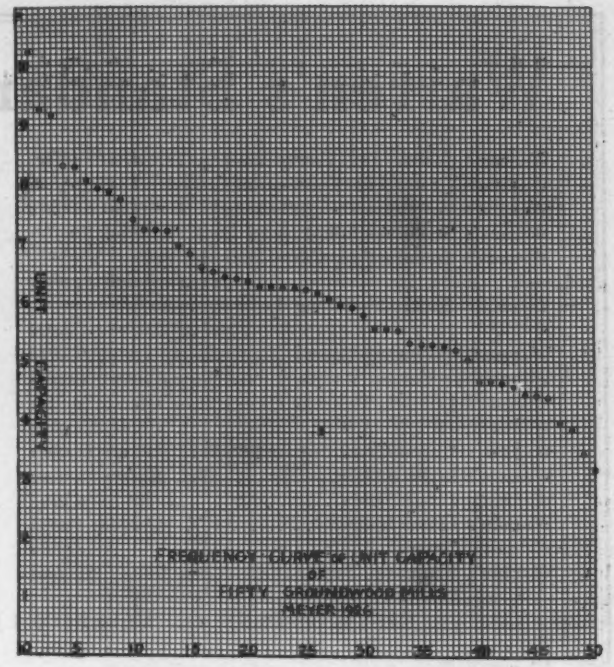

FIG. 2

UNIT CAPACITY = 1000 feet peripheral speed x unit pressure x unit surface ÷ 500

UNIT POWER = hp. consumed per 1000 feet peripheral speed per hundred sq. in. pocket area.

COMPUTED GRINDING PRESSURE =

12x 33,000 x hp.

(lb. per sq. in. in cylinders)

A x C x N x R x D x Pi

hp. = Horsepower per grinder
A = Area of cylinders in square inches
C = Coefficient of grinding friction (average value taken as 0.2)
N = Number of pockets per grinder
R = Revolutions of grinder per minute

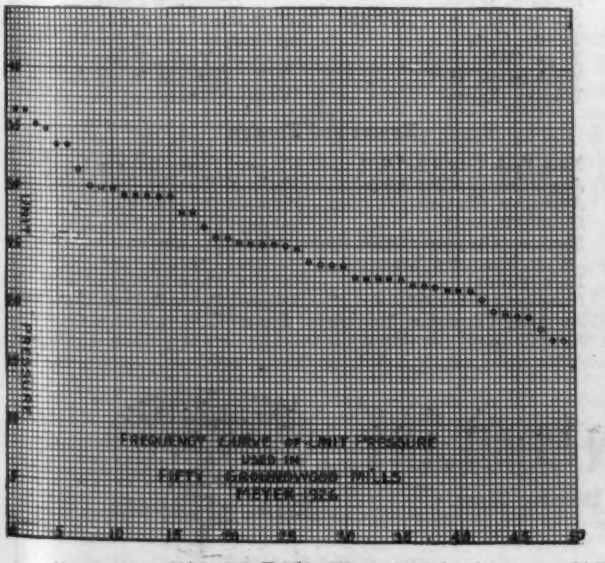

FIG. 1

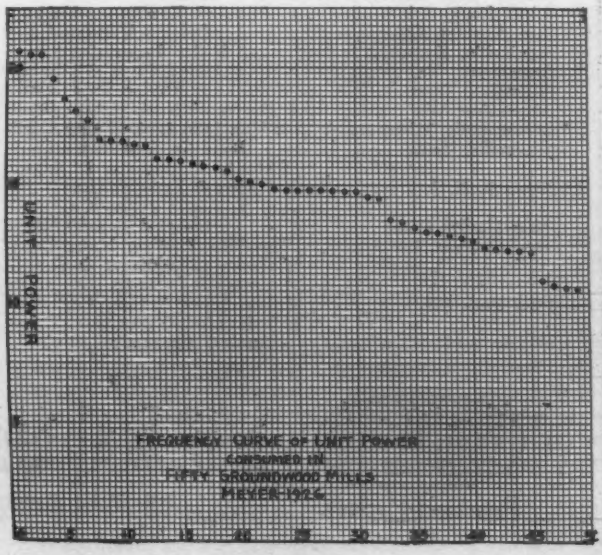

FIG. 3

Warren's Standard Printing Papers

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Semi-dull Surface
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Semi-dull Strong Coated
WARRENFOLD—Strong Coated.....*Glossy Strong Coated*
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WARRENTOWN COATED BOOK.....*Glossy Surface*
WARREN'S CUMBERLAND COATED BOOK.....*Glossy Surface*
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WARREN'S LITHO SUPER.....*Super-calendered*
WARREN'S LITHO MACHINE.....*Machine Finish*
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English Finish
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WARREN'S OLDE STYLE—Antique Laid.....*Laid Antique*
(Watermarked)
WARREN'S OLDE STYLE MIMEOGRAPH—Laid....*Mimeograph*
(Watermarked)
WARREN'S CUMBERLAND SUPER BOOK.....*Super-calendered*
WARREN'S CUMBERLAND MACHINE BOOK....*Machine Finish*
WARREN'S "1854" PUBLISHER'S BOOK.....*Medium Finish*
WARREN'S No. 66 BOOK—Bulking Antique..*Antique Finish*
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D = Average diameter of grindstone in inches
Pi = 3.1416

The following table is given to show the variation between different mills in the calculation of these unit items:

Mill No.	hp. per Pocket hp.	Grinding Stated hp.	Pressure Computed lb.	Unit Pressure lb.	Unit Surface in.	Unit Capacity	Unit Power
1	144	50	56	22	45	5.2	15
2	159	95	77	35	40	8.3	17
3	150	50	40	24	48	6.8	13
4	183	85	68	36	45	9.2	18
5	163	65	46	36	45	9.2	16
6	186	65	77	28	45	6.3	21
7	112	70	90	19	36	3.4	16
8	122	50	39	28	45	6.3	14
9	117	50	37	28	45	6.3	13
10	175	50	66	21	45	5.3	18
11	186	60	77	26	45	5.8	21
12	173	50	62	21	45	5.6	17
13	111	70	78	19	36	4.0	13
14	83	40	30	17	45	4.4	8
15	144	65	57	28	45	6.6	15
16	111	48	40	20	45	5.3	11
17	167	60	55	26	45	7.2	15
18	117	50	35	25	45	6.0	12
19	183	75	64	30	45	8.1	17
20	150	50	56	21	45	5.3	15
21	167	70	63	30	45	7.4	17
22	88	65	48	22	39	4.4	11
23	147	58	54	24	45	5.9	14
24	122	45	42	19	45	5.3	11
25	147	58	55	25	45	6.1	15
26	153	55	61	24	45	5.6	16
27	133	35	46	17	45	4.6	12
28	147	65	56	34	45	8.3	15
29	155	50	45	29	45	7.2	16
30	133	95	76	22	42	4.7	16
31	147	60	58	27	43	6.1	16
32	178	45	47	22	46	6.2	15
33	133	95	69	35	36	7.0	17
34	167	40	47	31	36	6.4	21
35	133	40	43	22	45	5.0	15
36	114	30	46	15	60	4.6	12
37	93	50	59	18	39	3.2	13
38	178	65	49	25	45	6.5	13
39	192	45	44	30	45	7.7	19
40	150	65	46	34	45	7.9	16
41	150	45	40	25	60	10.3	12
42	150	47	42	25	45	6.4	15
43	150	40	43	22	45	5.5	15
44	145	45	42	25	45	6.2	15
45	154	35	56	22	45	4.4	20
46	100	35	36	20	45	3.8	13
47	156	50	41	29	45	7.9	15
48	108	65	56	22	39	4.7	13
49	107	55	31	29	45	7.2	11
50	182	65	50	24	48	6.4	12
Means	144	56	53	25	45	6.2	15

General Explanation of Items

General explanation of these items and table follows:

The derivation of the several units of comparison suggested may be exemplified by the following computations for mill No. 1:

In addition to the data stated in the foregoing table, the following are required—

R.p.m. of grinder	215
Diameter of cylinder	14 inches
Width of pocket	15 inches
Length of wood used	24 inches
Diameter of grindstone when new	54 inches

From the r.p.m. and an average grindstone circumference of about 12 feet, we get 2,600 (2.6 thousand) feet peripheral speed.

From the length of wood used and the width of pocket, we get 360 (3.6 hundred) square inches pocket area.

$$\text{Unit Pressure} = \frac{50 \times 154}{20 \times 15} = 22$$

$$\text{Unit Surface} = 3 \times 15 = 45$$

$$\text{Unit Capacity} = \frac{2.6 \times 22 \times 45}{500} = 5.2$$

$$\text{Unit Power} = \frac{144}{2.6 \times 3.6} = 15$$

The data for all the mills given were supplied in connection with orders for Meyer governors.

The stated grinding pressures are those given by the mills before the installation of governors. The computed grinding pressures indicated either that the grinding pressures were stated incorrectly by the mills, or that there is material difference in the power consumed in producting pulp under different grinding conditions in the several mills. The stated grinding pressure was used in all computations.

The width of pockets was not always stated and therefore had to be assumed in the computations. Where cylinders were 14 inches or 16 inches in diameter, a pocket width of 15 inches was usually assumed. For 12 inch cylinders a width of 13 inches was assumed when not stated.

Report of the Sulphite Pulp Committee

By B. S. Summers,* Chairman, and R. N. Miller,† Vice Chairman

The committee work for the past year has been largely confined to the method of testing pulp for strength and the bleaching of pulp.

A Test for Quality

A test method has been arranged which takes into account much of the work done in mill laboratories throughout the country. It is possible by its use to show a close relation between the physical properties of a pulp and the cooking conditions under which it was produced. The correlation between cooking conditions and the measure of their effect on the quality is close and by following the principles laid down it should be possible to produce pulp of the quality most suitable for its use.

Hydration Test Needed

Much is still to be desired in regard to the hydration of pulps and methods for bringing it about without disintegration of the fiber. A great deal could be done toward improving the quality of certain papers if the hydration effect on long fibers were clearly differentiated from the effect of disintegrated fiber, cellulose, mucilage, and the like.

New Methods of Cooking

Further applications have been noted of the sulphite process with a soda or magnesia base for the resinous as well as the hardwoods. The results thus far are not sufficient to make a definite statement, but they are apparently encouraging. Cross and his associates are claiming good results from ammonia with sulphurous acid but thus far they do not appear to be conclusive.

Chips Should Be Weighed

Owners and managers should realize that the difference between controlled and indifferent cooking procedure may mean a difference of 10 per cent in the yield of pulp from the wood. More definite consideration should be given to the potential value of weighing the chips into the digester and a knowledge of the resultant pulp as to quantity as well as quality.

Decker Process

There has been a steady increase in the application of the Decker Process for the direct recovery of the heat in the relief as well as the liquor and gas during digestion. This would appear to be the American line of advance instead of the Ritter-Kellner system common in Europe.

Waste Liquor

A development of growing interest is for the profitable utilization of the waste sulphite liquor as indicated in the report of the Waste Committee. From a study recently made on stream pollution it was found that the biochemical oxygen demand of this waste is about 26 times that of domestic sewage, thereby indicating its relative effect on fish life when discharged into streams.

High Density Bleaching

High density bleaching continues to grow in favor and the use of equipment for it is expanding rapidly. The advantages of this system will be discussed at the Meeting.

* Consulting Chemical Engineer, Port Huron, Mich.
† Chemist in Forest Products, U. S. Forest Products Laboratory, Madison, Wis.

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TISSUE PAPERS

Evaluation of Sulphite Pulp*

By Dr. Th. Bentzen,*

Far from the intention of adding to the multitude of theories already existing about Cellulose in general and sulphite in particular, I only want to call your attention to some interesting facts about sulphite pulp, and to explain how the knowledge of these facts makes it possible with certainty to estimate its value and thereby to compare different sulphite pulps as useful papermaking materials.

As I am addressing not only the paper mill chemist, but as well, or perhaps much more, the general paper maker, I shall as far as possible, avoid all scientific terms, and where it may be necessary to use them, I shall try to explain their meaning intelligibly to all. I want the general paper maker and the superintendent, as well as the office man, to know and understand these facts, that they may be able to estimate the value of the pulp in question with respect to furnishing and calculating. At the same time I believe that I shall be able to be of help to the chemist, calling his attention to some forgotten facts and proposing some new methods.

Sulphite Pulp Is a Cellulose

"Cellulose" is the designation of the structural tissue forming the walls and skeletons of plants. Those who should like to know about its classification in organic chemistry (that part of chemistry covering the theory of the carbon linkages) as a carbon hydrate, and to understand what this means, could do nothing better than to read "Triumphs and Wonders of Modern Chemistry," by Geoffrey Martin, chapter 10, where it is told very interestingly and sufficiently detailed in a popular way and in "non-technical language for general readers." To those who want to study the cellulose problem more scientifically can be recommended: Emil Heuser, "Textbook of Cellulose Chemistry," translated by C. J. West and G. J. Esselen, 1924, to start with.

The Three Components of Sulphite Pulp

If we prepare a sample of sulphite pulp just the same way as we are preparing a microscopic paper test, boiling a little part of it in test tube in about 1 per cent solution of sodium hydrate, beating it sufficiently long in another test tube (thick wall) with help of marble chips, washing, drying and staining it, and then take a look at the slide through the microscope, we observe the clean, strong and uniform shape of the fibers and if we do not know better, we might believe that the whole pulp, through and through, has the appearance of this microscopic image.

But unfortunately, it is not so. The wood pulp consists (so far as we need to know about it) of three groups with very different qualities, and if we want to learn the real value of a certain sulphite pulp, then we must know as much as possible about each of these three groups, about their nature as a cellulose as well as about their value as a material for paper making, and we must understand how to separate them and determine their respective percentages.

But now the question will involuntarily put itself forward: Why do we not, through the microscope, see parts of all the three different groups? Why do we see only one of them and not the other two? To answer this question we need only remember how the small part of the pulp was prepared for the microscopic examination. It was heated to more than 100 degrees, C., boiled with sodium hydroxide solution, and then washed, and as only one part of the pulp was able to resist the influence of the hot alkali, the other two parts or groups passed into solution and were washed away, leaving the fibers representing the group of practically true cellulose, upon the screen. This quality of resistance to alkali, which distinguishes the one of the three groups in opposition to the solubility of the other two, we make use of to separate the groups. The principle of this method may in itself not be new, but the way I have worked it out in detail to make it give absolutely reliable results, is new, and it is this method I am now going to explain.

Separation of the Celluloses

The three main groups of cellulose are usually designated as 1, True Cellulose (fibers); 2, Oxycellulose (oxidation products of the cellulose without fibrous structure) already from nature present in plants; and 3, Glucose (sugar). This designation is theoretically correct as long as we imagine the groups as completely isolated from each other. In reality, however, the three groups as well as their intermediate stages are already in nature altogether and always simultaneously present, and it is practically impossible to obtain a uniform cellulose of one single kind, since the oxidation or hydrolysis (chemical actions) does not stop at any one of the intermediate steps. I therefore want to keep aloof from these theoretical designations and replace them with the first three letters of the Greek alphabet: Alpha, Beta and Gamma.

Alpha Cellulose

Alpha cellulose is that part of the pulp which does not dissolve in alkali, but retains its form as fibers. It is practically to be regarded as true cellulose with maximum resistance to the air and chemical reagents, and therefore forms the most permanent basis for the manufacture of paper.

Beta Cellulose

This group consists partly of products which are distributed in plants, but mostly of material broken down in the manufacture of chemical pulp from wood. It is therefore always more or less present in the wood pulp as we receive it from the pulp mill. It dissolves in a solution of sodium hydroxide from which it will be precipitated through acids. It does not have the form of fibers but will take the shape of a flocculent and structureless substance, which probably may function in the paper in the nature of filler or size.

Gamma Cellulose

Gamma cellulose is that part of the cellulose dissolved in alkali which, in contradistinction to the former group, cannot be precipitated by acid but remains in solution, and may be considered as a natural sugar-like body already present in plants. This part of the sulphite pulp will, of course, leave the paper machine together with the white water and at all events is completely worthless to the paper maker.

Thus it must be understood that "Alpha" does not mean true cellulose, "Beta" not oxycellulose, and "Gamma" not glucose. Alpha means much more to us than part of the cellulose which is not dissolved by alkali, and will probably consist of true cellulose together with an unchanged cellulose of a lower group as well as of the intermediate stages. And corresponding relations and connections will be found mutually present in and between the other groups. Therefore "Alpha," "Beta" and "Gamma" have a much more physical than a chemical meaning:

Alpha—fibers which do not dissolve in alkali.

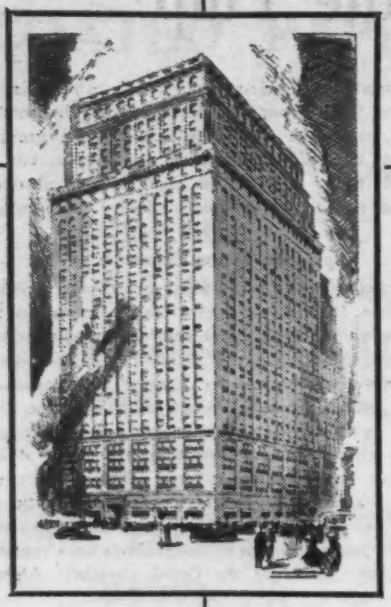
Beta—those parts of the cellulose which dissolve in alkali and which are precipitated by acid.

Gamma—those parts of the dissolved cellulose which do not precipitate by acid.

Determination of the Three Groups (An improved mercerization method)

1. A sheet of the sulphite pulp to be tested is left hanging over

* Member TAPPI; Chief Chemist Whiting-Plover Paper Co., Stevens Point, Wis.



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night under normal room conditions (temperature about 20 to 22 degrees C., relative humidity about 50 to 65 per cent) to become practically air dry.

2. Sufficient of this pulp is taken and folded or rolled together to form a compact "stick" about 2 or 3 inches thick.

3. From this "stick" with help of a Schroeter's Improved Grater No. 100, about three grams of pulp are ground to fine fibers, from which the parts or pieces of insufficiently ground pulp must be removed.

4. A pyrex glass beaker of about 350 cc. capacity with a well fitting cover (the cover of a tin moisture dish, of a porcelain crucible or a watchglass) is dried in the oven for one to two hours at a temperature of about 110 degrees C., then cooled in the desiccator and exactly weighed.

5. Leave the beaker upon the balance and add about 3 to 3.5 grams of the air dry ground pulp (see No. 3) with help of a forceps so that none of the pulp sticks to the wall of the beaker (avoid frictional electricity).

6. Place the beaker with the pulp as well as the loose cover in the oven for three hours at a temperature of about 100 degrees C. (105 degrees C. maximum).

7. Cool off in desiccator.

8 Place the cover upon the beaker before removing it from the desiccator.

9. Determine the exact weight.

10. The manipulations, No. 6 to 9, are repeated until constant weight is obtained. This weight minus the weight of the dry beaker and cover (see No. 4) represents the weight of the dry pulp.

11. Add 50 cc. of a freshly made sodium hydroxide solution 17.5 per cent (8.75 grams sodium hydroxide C.P. dissolved in distilled water, until 50 cc. volume and cooled). Add the solution slowly, letting it run down along the wall of the beaker and then without delay, stir carefully with help of a not too thin (about ¼ inch) thermometer preventing any loss of pulp.

12. Let the pulp-alkali mixture stand quietly for exactly one-half hour at a temperature of exactly 18 degrees C., which easily can be obtained and regulated by placing the beaker in running water, which passed a container with ice.

(In the Whiting-Plover mill, which as you know is famous for its high grade water, I have spring water at my disposal, which through all seasons is always of the same temperature and moreover as low as 7 degrees C., which, of course, makes it very easy to obtain a constant temperature of 18 degrees C. There is, according to Heuser (Textbook, page 24), a relation between the temperature and the concentration of the alkali, which permits the use of a considerably weaker liquor if the temperature is kept low, but the above reported conditions seem to me to be the most practical and thereby to be pretty possible to obtain. On the other hand, a temperature as high as 20 degrees C. must be avoided, as it would obstruct the production of the mercerization effect.—Author's note.)

13. Then dilute with 250 cc. distilled water.

14. Filter through an alundum filter cone, medium porosity (soaked in distilled water just before use) by help of vacuum.

15. Drain as far as possible.

16 Wash out, refilling the filter repeatedly with distilled water until no trace of alkali is left, and the total filtrate amounts to about 1 liter or more.

The yellow color of the filtrate is due to that part of oxycellulose which is soluble in alkali (see Heuser, Textbook of Cellulose, page 87) and can very often be noticed during the preparation of the material for a microscopical paper test.

17. Soak the substance upon the filter with dilute acetic acid. This is necessary in order to break up the combination of alkali and cellulose. ($C_6H_{10}O_5 2NaOH$ the probable formula for mercerized cellulose.)

18. Wash ten times with hot distilled water until no acid reaction can be proven.

19. Drain as far as possible.

20. Put the filtrate aside for later further test.

21. The residue is carefully transferred to a weighing bottle or more practically to an aluminum moisture dish (of known dry weight) with help of a small thin flexible spatula and a small stiff tooth brush, avoiding any loss of material. After having been used, the alundum cone, as soon as possible must be perfectly cleaned, leaving it for one-half hour in hot water, whereupon it is perfectly dried in the oven, and then burned out over the Bunsen burner.

22. The moisture dish with the residue is dried in the oven for, three hours at a temperature of about 100 to 105 degrees C.

23. Cool in desiccator.

24. Cover dish before removing it from desiccator.

25. Determine the exact weight.

26. Manipulations No. 22 to 25 are repeated until constant weight is obtained.

27. The weight of this precipitation represents the Alpha cellulose, the percentage to be expressed in proportion to the weight of the dry pulp. (See No. 10.)

28. The filtrate from No. 20 is acidified with acetic acid.

29. Digest on water bath with moderate heat until the precipitation coagulates sufficiently to be collected upon a paper filter of exactly known dry weight.

30. Rinse the precipitation thoroughly with distilled water.

31. Drain and dry as far as possible.

32. Then dry the filter with its contents in the oven, in a weighing bottle of known weight, for 3 hours, at a temperature of about 100 to 105 degrees C.

33. Cool in desiccator.

34. Cover the weighing bottle before removing from desiccator.

35. Determine the exact weight.

36. Repeat manipulations No. 32 to 35 until constant weight is obtained.

37. The weight of this precipitation represents the Beta cellulose, the percentage to be expressed in proportion to the weight of the dry pulp (see No. 10).

38. The weight of the Alpha cellulose (No. 27) plus the weight of the Beta cellulose (No. 37), subtracted from the weight of the dry pulp (No. 10), represents the Gamma cellulose, the percentage to be expressed in proportion to the weight of the dry pulp (No. 10).

With help of these valuations it is, of course, easy to find out their proportions to the equivalent weight of air dry pulp, and per sheet and bale of the pulp as it is held in stock.

Discussion

We shall now illustrate this test method through the report of a few experiments made with a high grade sulphite pulp:

Experiment No. 1

2.5384 grams dry sulphite pulp were mercerized and gave as result:

1.9480 alpha = 76.7413 per cent or about 77 per cent
0.5093 beta = 20.0638 per cent or about 20 per cent
0.0811 gamma = 3.1949 per cent or about 3 per cent

This means that a high grade sulphite pulp contained 23 per cent decomposed cellulose, or nearly one-quarter of the pulp.

According to known facts, the alkaline solution has no influence upon true cellulose, and to prove this we shall proceed to

Experiment No. 2

The 1.9480 Alpha cellulose from Experiment No. 1 was again mercerized, etc., with the result that the weight of the Alpha remained unchanged. In this way it is sufficiently proven that the mercerization did not cause any change of the true cellulose and it is therefore at the same time proven that the pulp as we received it from the pulp mill, besides true cellulose contained a comparatively large amount of decomposed cellulose, a part of which very

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probably was present from nature, whereas the largest part unquestionably came into existence through the manufacturing on its way from wood to pulp.

According to this the pulp mills already, for a long time, have been facing the problem of manufacturing a sulphite pulp which contains less decomposed cellulose, and to a certain extent the difficulties have already been overcome, since a sulphite pulp is on the market which, according to a test, gave the result:

> True cellulose 91 per cent and only 9 per cent decomposed, but it gives us a "soft" paper, as this pulp works like "old rags."

We will now direct our attention to another fact:

When cellulose is heated it will gradually oxidize, absorbing oxygen from the air, and therefore a part of the sulphite pulp will be likely to decompose during the beating process. To prove this we will proceed to the third experiment.

Experiment No. 3

The *Alpha* pulp from Experiment No. 2 was placed in a beaker (exposed to the air) with 50 cc. distilled water and heated during two hours at a constant temperature of 40 degrees C. Then the sample was filtered, drained and dried, whereupon it was mercerized. The result was:

97.6178 per cent Alpha or about 97.6 per cent
1.2911 per cent Beta or about 1.3 per cent
1.0911 per cent Gamma or about 1.1 per cent

which means that the pulp, as a result of being exposed to strong beater conditions, will lose only about 2½ per cent of its papermaking value.

If we want to express the total loss caused by decomposed cellulose present in the pulp from the mill (Experiment No. 1), plus decomposed through beater conditions (Experiment No. 3), according to percentage, the calculations would be:

100 original pulp = 76.74 per cent Alpha cellulose + 23.26 per cent decomposed.

100 Alpha cellulose changed through beater treatment into 97.6 per cent Alpha cellulose + 2.4 per cent decomposed,

and as $\frac{76.74 \times 2.4}{100} = 1.84$, and as $23.26 + 1.84 = 25.10$

we have a total loss of 25.10 per cent of the sulphite pulp, which means that only three-quarters of it was real papermaking material.

Before anybody else, Carl Hofmann, in his remarkable book on paper making, directed our attention to the fact that the presence of free chlorine left in the stuff from the bleaching, will cause a breakdown of the hitherto good and strong cellulose in the moment the paper passes over the driers. It will be deprived of its strength and turn into a brittle product, which will grow worse the longer it is held in stock.

It is, of course, pretty difficult or rather impossible, to produce, through a laboratory experiment, such a brittle paper and thereby prove that this theory is founded upon an indisputable fact. But it is possible to prove, in a common way, that an exorbitant treatment with respect to heat by presence of chlorine, may be fatal to the pulp as we shall learn from the next experiment.

Experiment No. 4

The Alpha cellulose from Experiment No. 3 was placed in a beaker with 150 cc. distilled water and a trace of bleaching powder and then exposed to a temperature of 70 degrees C. for 6 hours, whereupon the sample was filtered, drained and dried (the whole manipulation of Experiment No. 3 over again) and then mercerized. The result was:

> Upon the alundum cone 90.9814 per cent or about 91 per cent alpha cellulose.
>
> The filtrate contained 3.9787 per cent or about 4 per cent beta cellulose, and 5.0399 per cent or about 5 per cent gamma cellulose.

But if we examine the 91 per cent residue upon the alundum cone more carefully, we will learn that it has almost lost the fibrous shape which hitherto characterized it as *Alpha* cellulose, now mostly forming a substance resembling pulverulent dust. The true cellulose is almost altogether broken down into an intermediate non-soluble stage which, under further favorable conditions, will decompose totally into the final state, the soluble *Gamma* cellulose.

To demonstrate that different shipments of the same grade of sulphite pulp from the very same mill may give very variable results, the following test was made from another shipment than that used for Experiment No. 1.

Experiment No. 5

2.4293 grams dry pulp gave as:
1.9000 alpha = 78.2118 per cent or about 78.2 per cent
0.3250 beta = 13.3782 per cent or about 13.3 per cent
0.2043 gamma = 8.4100 per cent or about 8.5 per cent

In this way the pulp from Experiment No. 1 contained 77 per cent good pulp and 23 per cent decomposed pulp, and that from Experiment No. 5, 78.2 per cent good pulp and 21.8 per cent decomposed pulp. Of the decomposed pulp from Experiment No. 1 about 13 per cent was absolutely waste (Gamma), whereas from Experiment No. 5 only about 3.9 per cent was to be considered as waste, as far as we are inclined to suppose that the *Beta* cellulose is useful to the paper as a filler or size, and therefore not absolutely to be considered as waste, but as material, although by far not as valuable as the Alpha.

The question whether a paper partly or fully made from sulphite pulp is as permanent as a paper made out of pure rag, is a recurrent problem. To be able to answer this question regarding it from different theoretical viewpoints, and be able to make comparisons, we must know about the composition of rag cellulose. For this purpose the following experiment was performed.

Experiment No. 6

3.440 grams air dry, absolutely clean cotton was dried in the oven at a temperature of 103 degrees C. until a constant weight of 3.300 gr. It was then mercerized and gave as a result:

3.2793 alpha = 99.3728 per cent or 19.4 per cent
0.0176 beta = 0.5333 per cent or 0.5 per cent
0.0031 gamma = 0.0939 per cent or 0.1 per cent

As I had finished my paper, a chemist-colleague who was reading it over protested against my comparing the percentage of alpha cellulose of the sulphite pulp with that of absolutely clean cotton, "surgeon's cotton," which so far as I know all cellulose experts (among others Cross & Bevan, "Researches on Cellulose, 1905-1910" page 18, besides Swedish chemical filter paper and the calico cotton printers) classify as "normal cellulose" because such cotton never was used as a material for paper making.

To prove whether the difference between "normal cotton" and high grade papermaking cotton would be of practical importance, Experiment No. 6 was performed. Exactly 3 grains of dry cotton (new denims) was mercerized and gave as a result:

2.958 Alpha = 98.60 per cent
0.006 Beta = 0.20 per cent
0.036 Gamma = 1.20 per cent

The difference between the "absolutely clean cotton" and the high grade papermaking cotton is therefore practically without importance:

99.4 per cent Alpha against 98.6 per cent compared with the only 74.9 per cent Alpha of the sulphite pulp.

If, according to our different experiments, we compare these facts:

> Cotton 99.4 per cent pure cellulose, sulphite pulp only 74.9 per cent, and cotton only 0.6 per cent decomposed cellulose against sulphite pulp 25.10 per cent,

it seems that we have reason to suspect that the presence of 25 per cent decomposed cellulose, which amount we know is likely to increase while the pulp passes from beater to calender, will cause such paper which contains sulphite pulp to be less capable of resistance to moisture, air and light, than the paper made out of pure rag.

TECHNICAL SECTION, PAGE 100

Satisfaction in Sizing

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But we do not know anything about it for certain. The opinions about the permanent quality of such papers are very different, oscillating from one extreme to another. I have seen a statement from a kind of Bureau of Standards in Germany which in very guarded terms expresses the opinion that "if the cellulose is carefully washed, the paper will have keeping quality." That kind of a statement does not offer us any guarantee at all. On the other hand a declaration like that of H. P. Stevens, in his book, "The Paper Mill Chemist" (London, 1919), "that fibers isolated from wood, straw, esparto, etc., when converted into paper may not be found so lasting or permanent even when carefully prepared, as the fibers contained in cotton and linen papers that have stood for centuries," does not give us sufficient information as it does not prove facts, but only expresses an individual viewpoint.

But we want to know for sure, we want facts, and we must strive with might and main to procure them. We should have done this long ago, but better late than never, and as a preventive against this dangerous "never," I shall propose that we—TAPPI, you and I—all of us induce the Bureau of Standards to take care of this utmost important matter. This institution has the authority to start it, and the qualification and capacity to run it. It would take us too far to talk in detail about a practical and uniform system for this purpose with respect to samples, tests, records, and reports. I have worked out some sketches in this direction and shall be glad to leave them in the right hands and talk them over with the right people.

Before closing my paper, I want once more to mention that so far as I, at the present time, can see, the Beta cellulose seems to be of more use than harm to the paper upon the wire. It seems to me that although it does not work directly as a paper forming or paper building material, it helps to give the paper more strength.

I am now working with all my power and energy at this problem which also will encompass the investigation and determination of the well known yellow spots so commonly present in the sulphite pulp. I hope that I shall be through with this matter by the time we meet again, and with our Chairman's permission I shall then tell you what I have found out about it.

Evaporator Test Code for Pulp Mills

Report of Soda Pulp Sub-Committee

The sub-committee appointed by the chairman of the Soda Pulp Committee to prepare a data sheet for the test of evaporators, herewith submits its report.

It was the understanding of the committee that its instructions were to prepare a data sheet to be used when tests are run on various types of multiple effect evaporators such as are used in the pulp industry. In view of the difficulty in conducting such tests, it was thought desirable that the information obtained should be recorded as far as possible on a standard form. Comparisons as to operating conditions and efficiency could then be made much more easily.

The committee felt it unwise to ask for more information than was absolutely necessary.

The data sheet is self explanatory.

If it is the wish of the Soda Pulp Committee, the sub-committee will be very glad to receive the results of any tests made in accordance with this data sheet, and to furnish comparisons with other tests, together with comments.

JOSEPH E. PLUMSTEAD, Chairman; RALPH MAIR, C. L. WAGNER

Evaporator Test Data

1. Type of evaporator.
2. Kind of liquor—soda, sulphate.
3. Kind of wood cooked.
4. Guaranteed capacity.
5. Specifications:
   - (a) Number of effects;
   - (b) Total number of flues in all effects;
   - (c) Diameter of flues;
   - (d) Length of flues;
   - (e) Gauge of metal;
   - (f) Character of flue metal;
   - (g) Total square feet of evaporator surface.
6. Preheater. Yes. No.
   - (a) 1—Temperature of liquor entering preheater;
     2—Temperature of liquor leaving preheater;
   - (b) Relative location of preheater (mark on chart).
7. Condenser:
   - (a) Wet, dry;
   - (b) Type of condenser pump used.
8. Steam:
   - (a) 1—Is exhaust steam used?
     2—Where is it used?
     3—Source of exhaust—turbine, engine pump;
     4—Pressure;
   - (b) If steam is superheated, how many degrees?
9. Pressure, vacuum, etc.:
   - (a) Steam *Pressure, lb.* or *Vacuum, in.*
     1—Into first effect; 3—Into third effect;
     2—Into second effect; 4—Into fourth effect;
     (Effect numbered according to flow of liquor)
   - (b) Vacuum condenser:
     1—Temperature of water ejection, degrees F.
     2—Temperature of water ejection, degrees F.
10. Liquor: *Gravity, Be.; Temperature, degrees F.*
    - (a) Weak liquor entering;
    - (b) Liquor leaving first effect;
    - (c) Liquor leaving second effect;
    - (d) Liquor leaving third effect;
    - (e) Liquor leaving fourth effect;
      (Effects numbered according to flow of liquor).
11. Liquor pumped in, gallons per hour.
12. Liquor leaving, gallons per hour.
13. Water evaporated from liquor, gallons per hour.
14. Steam consumption, pounds per hour.
15. Elapsed time of test.
16. Weak liquor handled per pound of steam used, gallon.
17. Water evaporated from liquor per pound of steam used, gallon.

Supplementary

1. Liquor *Lb. soda per gallon.*
   - (a) Weak liquor entering;
   - (b) Liquor leaving first effect;
   - (c) Liquor leaving second effect;
   - (d) Liquor leaving third effect;
   - (e) Liquor leaving fourth effect;
     (Effects numbered according to flow of liquor).
2. Are special baffles used? If so, where and of what type?
3. If foam killer is used, what kind? Is entrainment eliminated?

Chart

Steam. Quadruple Effect. Condenser

O O O O O

Steam. Triple Effect. Condenser

O O O O

Number effects according to flow of liquor.

If light liquor enters into second or third, that effect should be marked "No. 1," next in series, No. 2," etc.

If heavy liquor goes into first body for finishing, this should be marked "No. 4."

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Preparation and Utilization of Hand-brushouts in the Coating Mill

By Norman Clark

Outside of the few mills utilizing hand-brushouts properly in their regular operation, there are two classes, graded according to their viewpoint. The first sees no use in hand-brushouts and regards them more or less an expensive toy, while the second considers them the panacea for all its ills. Both are wrong, as there is a very definite use and place for the hand-brushout, but it has its limitations. To go beyond that point is not only a waste of time and money, but very likely to get one into serious difficulties.

By "hand-brushouts" is meant a coat of color applied by hand to a sheet of paper, approaching, as nearly as possible, the effect produced by the coating machine. In the following paragraphs is set down what I consider the necessary requirements of materials, the proper procedure, and a plea for the right use of hand-brushouts.

Preparation of Material

PAPER.—To make the brushout of greatest value, the same grade and weight of raw stock should be used as will be used on the machine. This will tell a good deal about the machine run, how the sheet will take color, and how the color itself will finish. Because it will finish on the brushout is no proof that it will finish on the run, but if it will not finish on the sample, look out for trouble ahead. A quantity of paper of the same lot should be kept on hand with which to make comparison brushouts. For the ordinary mill making box paper, a 20-pound groundwood sheet is very satisfactory. Where, however, the grade of stock used is very different, as boxboard, that grade on which you would like to see the colors tried out, should be kept. I have mentioned keeping a quantity of the same lot of stock on hand to insure having paper of the same properties as to color, surface and sizing, on hand.

BRUSHES.—The brushes best adapted for the purpose are the type used when coating was done by hand. There are two, a color brush of horse hair bristle and a finishing brush of badger hair. They are both 8 inches long, 3 inches wide with bristles 2½ to 3 inches long. They are not kept in stock, but can be easily made by any brush manufacturer. Besides these two brushes, it is well to have a 1 inch round painter's brush of coarse bristle, in order to help the color through the strainer.

The brushes should be treated with the same care that is exercised with the machine brushes. Color should never be allowed to cake on them, and they should be thoroughly washed with warm water (not hot) after each color. The finishing brush should, of course, be dried before using. A washing with soap once in a while is beneficial.

SURFACE FOR COATING.—It is essential that there be a good surface on which to lay the paper to be coated. It should be firm but with a little resilience. A sheet of smooth finished cardboard or a double thickness of boxboard placed on a solid wooden table or bench has been found satisfactory.

Preparation of the Color

COLOR.—In preparing the color it must be borne in mind that this is no haphazard operation. It must be done with even more care and exactness than is devoted to the color for the machine, because you are dealing with much smaller quantities and a small error assumes tremendous importance when multiplied to a batch size ready for the machine. And the first thing I should say, would be to adopt a regular method of procedure. Use the same types of containers, and the same implements in order to get accustomed to them, so that the handling of the mix becomes automatic.

In mixing the color use mechanical agitation. There are various types that can undoubtedly be devised and set up by your millwright. It is best to arrange to have two vertical paddles with the double stirring action. However, they are simpler to construct with the single action.

For containers the number depends on the number of colors you intend making up at a time. For a good working quantity, let us say 6 porcelain lined cooking pots of 2 quart capacity and three 1 quart size. These will do for mixing the color. Then two flat bottom, porcelain lined, photographer's 8 by 14 inch developing trays for holding the color ready to be used. Besides these, half a dozen tablespoons, a dozen teaspoons, a half dozen table knives, one dozen 6 inch and one dozen 12 inch hard wood paddles. Practically all of these supplies can be purchased in the 5 and 10 cent store.

There is also necessary a strainer. This can be made in the form of a 6 inch square box without top, the bottom to be covered with double screening, an 80 mesh and a 40 mesh. The purpose of the 40 mesh is to protect the fine wire when working the color through the screen. All color must be strained before using

Glazed Plate and Waterproof Papers

It is understood that formulas given are approximate and will probably have to be varied to suit different operations, different colors, conditions on different finishing machines and varying requirements of sizing and waxing.

All percentages given are calculated on the dry content of color, size and wax.

Straight Pulp Color

For Glaze—100 grams Pulp color (dry weight)
2— 4 per cent Talc
8—10 per cent Casein
3— 6 per cent Carnauba wax

For Plate—100 grams Pulp color (dry weight)
12—15 per cent Casein

For Waterproof—Ground Coat
100 grams Pulp color (dry weight)
20 per cent Casein

In each case smooth out the color in the agitator without adding any ingredients. Add the talc and in case of reds a few drops of ammonia and mix again. Add the casein solution, mix, add the wax emulsion and mix. Allow color to stand two or more hours before adding any water. Then add sufficient to strain; any balance needed for spreading may be added in the color pan. Only add sufficient to make a free flowing mix. The color should be slightly heavier than that used on the machine. It is well to keep hydrometer readings in Baumé scale, of the color used. There will be a definite relation between the reading for hand work and that found best for the machine, so that once having determined the best reading for the brushout for a given color, we will have the proper reading for the machine.

When possible allow the color to stand without adding any water for 2 to 8 hours. After standing this way, the color seems more free flowing than when used immediately, and the size seems to have more effect.

PULP AND CLAY.—Mix the required amount of clay separately with 80 to 100 per cent by weight of water. Stir or agitate into a smooth cream and then add the pulp color and continue mixing. From this point on the procedure is the same as for straight pulp. The dry weight of the clay is, of course, added to the dry weight of the pulp to get the basis for calculating the percentages of the other ingredients.

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ANILINE AND CLAY.—Dissolve the dyestuff in an amount of water, not exceeding by weight 100 per cent of the weight of clay. To use a greater amount of water runs the risk of thinning the color too much. The dyestuff should be strained into the clay through a 100 mesh sieve, and the whole thoroughly agitated. Proceed as on the straight pulp in preparation of the color.

SOLUTION OF THE DYESTUFFS

Acid dyes are best dissolved by making a paste of the dye and cold water, adding the required amount of boiling water and continue boiling until solution is complete. Do not exceed a concentration of ¼ lb. per gallon.

Basic dyes, on the other hand, should never be boiled, otherwise proceed as with acid dyes with certain exceptions.

Auramine and Chrysoidine should not be heated over 160 degrees F.

Methyl violet should not be made into a paste with cold water, but should have boiling water poured on the dye directly.

Direct dyes proceed as with acid dyes.

Preparation of the Size

CASEIN.—Each manufacturer has his own method of making up casein. I will not attempt to say how it should be done, but will give the best method for general work that I have used. It is best practice to use a jacketed kettle equipped with an agitator and steam and cold water connections into the jacket.

50 gallons cold water—start agitator
100 pounds Lactic casein—add slowly and make up into a paste.
4 pounds Borax
6 pounds Sodium triphosphate } Dissolved in 8 gallons boiling water

This solution is then added to the casein, the steam turned on, and the mix brought slowly up to 150 degrees F. Shut off the steam and add 15 pounds of 26 degree ammonia. Do not turn cold water into the jacket until all white particles have disappeared and the casein solution is perfectly clear. Turn on cold water into the jacket and cool to 90 degrees F. before using. Keep agitator running during the entire process. During the process and afterward, it is better to keep a cover on the mixer, as it prevents evaporation to a large extent. If it is necessary to empty the casein from the mixer, place in clean barrels with covers. I would emphasize *clean* barrels! There is nothing that will so quickly turn a batch of casein sour as a small quantity of old casein gone wrong. The same precaution holds true for the mixer. The casein will keep at least a week and usually longer under these conditions.

GLUE.—Although glue is seldom used there are times when its use is desirable. Ground hide glue, free from grease, is preferable. It is a little more expensive than bone glue, but is cheaper to use as smaller quantities can be used, and besides it has the advantage

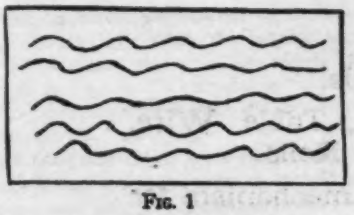

FIG. 1

of not having to add as much foreign material to the color mix. It is better to soak the glue in cold water for an hour before applying the heat. Make a concentration of 1½ to 2 pounds per gallon, heat in a double boiler or jacketed kettle to 160 degrees F., when all the glue should be in solution. In winter do not add glue solution to a very cold batch of color. It is best to heat the color up slightly in order to prevent jellifying of the glue.

Preparation of the Wax

Beeswax or carnauba wax, or both, are generally used for glazing work. Here, too, considerable variation in the method of preparation is apparent. Two different methods are set down for the two waxes.

120 pounds Yellow Beeswax
2/3 pounds Lye

Boil with live steam for one hour in about 25 gallons water. Shut off steam and add 2½ quarts of 26 degree ammonia, and agitate for 15 minutes. Bring the volume up to a concentration of one pound of wax per gallon of mix, with cold water. The carnauba wax is the most difficult of the waxes to form into a good emulsion. By following the directions given, a good emulsion is ensured.

100 pounds Carnauba Wax No. 2
25 pounds Soap (chip or borax)
25 gallons Water

Turn on direct steam and boil ½ hour after the soap and wax

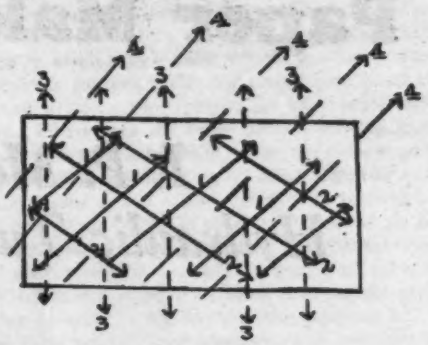

FIG. 2

are dissolved. Shut off the steam, and add 15 pounds of 26 degree ammonia, and bring up to 75 gallons with cold water. In both cases it is of advantage to have constant agitation during the process.

Preparation of Waterproof Top Size

There is more variation in the preparation and use of waterproof solutions than any other material used by the coating industry. I will not attempt to give any formulas, as manufacturers seem to consider this a more or less secret part of their operation. Shellac alone or shellac and casein mixes are usually employed, but the writer knows the surface has barely been scratched on the subject of waterproof solutions. I firmly believe it would pay a manufacturer large returns to carry on research work on this problem.

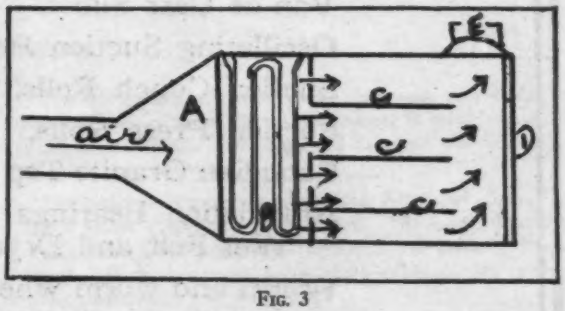

FIG. 3

TECHNIC OF THE BRUSHOUT.—COATING.—The sheet should be weighed and the weight reduced to the ream basis. It is better to cut an easily converted size from the finished sheet as ½ or ¼. The paper is laid on the bench, the short way opposite the operator, needless to say, felt side up. After straining the color into the color pan, and diluting to the proper consistency, tested by the hydrometer, the color brush is dipped into the color, and worked back and forth. The excess color is then squeezed out against the edge of the pan and the brush applied to the paper in one or two light wavelike strokes running the length of the paper, as shown, from left to right (Fig. 1).

Rapidly, before the color has a chance to set, the finishing brush is applied in the following manner: light rapid strokes are applied (1) back and forth the length of the paper at 45 degrees to the

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right, (2) 45 degrees to the left, (3) vertically, finishing up with (4) very light slanting strokes, merely to smooth out any brush marks. The strokes in their numerical order are shown (Fig. 2).

With a little practice this method will give a brushout that will, in evenness, be comparable to a machine run sheet.

DRYING.—If an air drying oven is available, that is best. One may be easily constructed out of a wooden box equipped with shelves with capacity for four sheets (whatever size is desired). A steam coil is set in the back and a slow current of air blown through the coil onto the shelves. There should be a vent at the top for the escape of the moist air. The box should also be equipped with a door. See Fig. 3.

If no drying box is available, the samples may be placed on metal strips laid on the steam pipes in the drying lines.

FINISHING.—When dry the sample is ready to be finished. It is then trimmed and, if a plate, is passed through two nips of the stack calender. If a friction glaze, the strip is passed through the nip of the friction calender alone, never on top of the web being finished. If to be flinted, recourse must be had to a hand process. Set the sample on a block of holly, pear or maple wood. Work the flint stone back and forth, crossways with the length of the sheet.

After finishing, the sheet is trimmed to size and weighed. By comparison with the original weight of the sheet, the weight of color is determined in the regular way. It is better not to use scales of more accuracy than the usual paper scales, so as to have results comparable with that obtained on the machine runs.

UTILIZATION.—The question is often asked, "What are hand-brushouts good for, anyway?" I'll try to answer that in a few words, but, bear in mind there is more danger from over-estimating than under-estimating their value, once they are adopted. The hand-brushout is valuable in its field, but do not expect the impossible.

The greatest misuse is for color matching for the machine. There is no doubt that if we could brush color on a sheet of paper, and the results show us just what we were to expect on the machine, it would be a wonderful saving of time, money, and temper. Unfortunately, in very few cases does the hand-brushout match the machine run from the same color. Differences in the method and time consumed in brushing, alone will account for this fact. But the hand-brushout has its value. There is more or less definite relationship between the result obtained on the machine, and that obtained with the hand-brushout which varies with the individual operator. After some experience in making hand-brushouts, it is not very difficult to estimate the appearance of the machine run from the brushout. The chances are that this opinion will be correct in so far that only one change will be necessary in making up a color for the machine according to the hand-brushout formula. The big saving here is apparent, but is lost, if you waste time in trying to get an absolute match with the brushout. I have seen the better part of the day spent in trying to get a match with a brushout, when the color man would have been just as close in making up his color according to the formula arrived at on his earlier trials. Another factor which enters into the matching is the weight of color on the sheet. As noted earlier, the sheet should always be weighed, but the operator will soon reach a point where he can gage the weight of color very closely.

COLOR.—The second point of value is in the comparison of new shipments of pulp or aniline with the previous lot. Great care must be exercised here that conditions and quantities are identical in both cases and that the weight on the sheets is the same. In making color comparisons, it is better to have these sheets to compare with an unfinished sheet, a plate and a glaze. This is, of course, provided you make a glaze.

Thirdly, the method is useful in trying out samples of new colors and the same care must be exercised as under the foregoing conditions. When samples are of different prices, mixes of the same money value should be prepared.

Increasing the Suspension of the Coating Mixture By the Addition of Colloids

By B. K. Steadman *

One of the difficulties encountered in the coating mill is the settling out of the clay when the coating mixture, consisting essentially of clay and casein, is allowed to stand before the machines. As this mixture is colloidal in nature the possibility of increasing the suspension by further deflocculation offers interesting possibilities.

This paper is offered chiefly with the purpose of suggesting the subject to the industry, and the tests are therefore to be considered as preliminary work only, not at all indicative of what might result from a carefully planned, scientific attack on the problem.

In making all the tests a coating mixture taken directly from the coating mill was used. This contained 50 per cent clay (air dry), 50 per cent satin white (wet basis), and 16 per cent casein. The casein was dissolved in the proper amounts of alkalies and water added so that the finished coating mixture was about 50 per cent water and 50 per cent dry materials. This mixture was used in making whitecoating and the tinting had already been added when samples were delivered to the laboratory.

The mixture was treated with three different substances, all of a more or less colloidal nature, to see if they had any effect upon the suspension of the solids in the mixture. In making all tests percentages of materials added were calculated on weight of coating mixture.

* Member TAPPI; Chief Chemist, Standard Paper Mfg. Co., Richmond, Va.

The three substances tried were tannic acid, gum arabic and S-brand silicate of soda. The last chemical is manufactured by the Philadelphia Quartz Company, and is about the nearest neutral silicate on the market.

The tannic acid was first tried, using 200 cc. of coating mixture and 2 grams (1 per cent) tannic acid. The tannic flocculated the mixture and a brownish mass formed on the surface. It probably reacts with the casein contained in the mixture. No further tests were made with tannic acid.

The mixture was likewise treated with different percentages of gum arabic and silicate of soda. Five per cent of the gum arabic made a good suspension but the solution thickened with a resultant increase in viscosity. Sheets were coated by hand with it, and the coating mixture did not spread evenly; also numerous pin holes were observed in the surface after coating. Silicate of soda was tried in the same way, but only 3 per cent was used. It behaved in much the same manner and thickened up the mixture even more than the gum. However, pin holes were not as pronounced with silicate as with gum arabic.

Of the three—tannic acid, gum arabic and silicate of soda—I would recommend the last as being tried further and in different ways from my tests. It might be possible to use silicate of soda and reduce the other alkalies used in dissolving the casein.

TECHNICAL SECTION, PAGE 104

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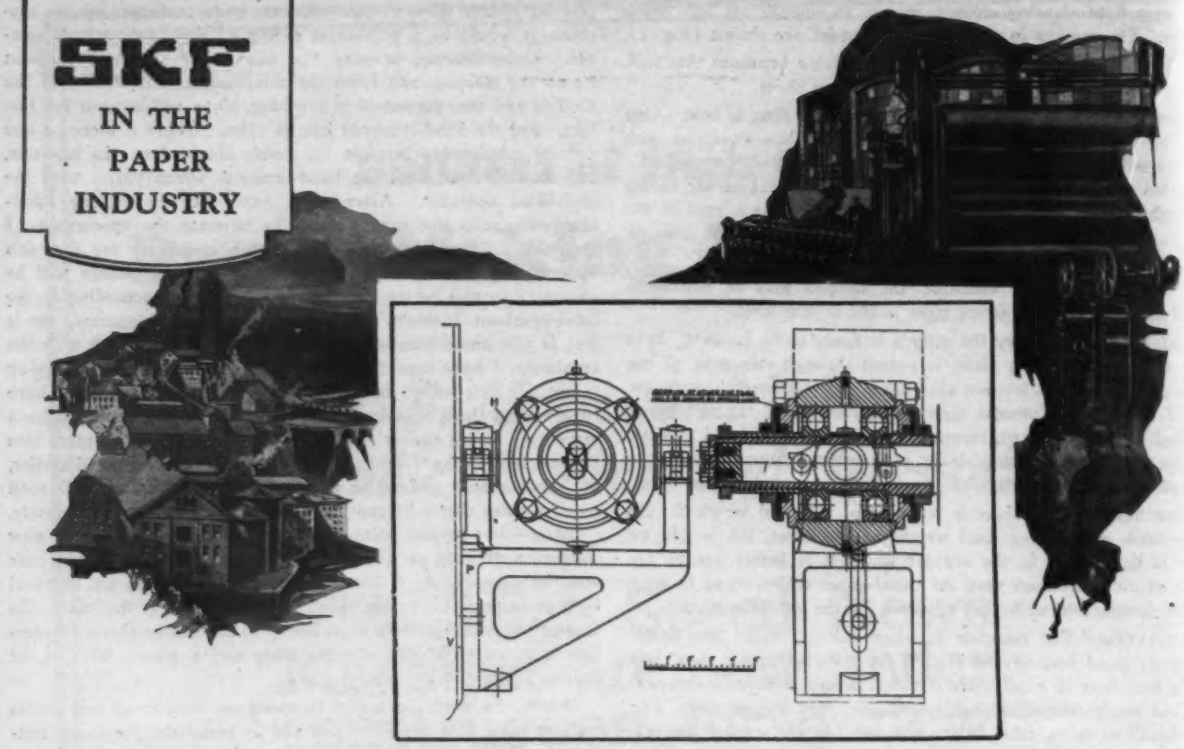

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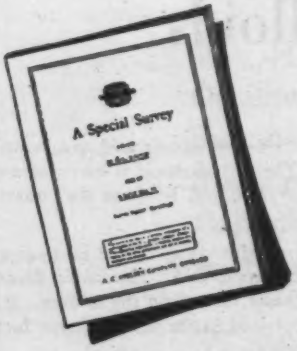

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The Significance of the Alpha-Cellulose Test for the Pulp Industry

By John L. Parsons *

The washed residue obtained as a result of the treatment of isolated cellulose, such as bleached chemical wood pulp or purified cotton, with a 17.5 per cent solution of sodium hydroxide has been termed "alpha," or "alkali-resistant" cellulose. The designation is an arbitrary one, however, for the extent to which the fibrous residue has been purified or changed by the alkali treatment has never been thoroughly investigated. In Volume III of their "Researches," Cross and Bevan mention the use of sodium hydroxide of mercerizing strength with reference to the diagnosis of a normal cellulose, as typified by highly purified cotton. The statement made by them that such a cellulose loses no weight by mercerization is at variance with the results of other investigators. Robinoff [3] found that both American and Egyptian cottons, purified under special conditions and termed by him "normal cellulose," were partly soluble (less than 1 per cent) in sodium hydroxide solutions over the concentration range 1 to 24 per cent. Lenze [4] states that alkaline liquor of mercerizing strength dissolves some of the cellulose, while both Schwalbe and Heuser contend that a complete purification of cellulose by mercerization is not possible.

A Criterion of Purity

Cellulosic material often contains considerable alkali-soluble matter, and for this reason the alpha-cullulose determination has become a criterion of purity for cellulose isolated by industrial processses. In the preparation of standard cotton cellulose for research and other purposes, the Division of Cellulose Chemistry, American Chemical Society, has used this determination as one of the purity constants. In a cotton purified in such a way as to bring about the minimum chemical change in the cellulose content, the alkali-soluble portion may exceed 1 per cent.[4]

For chemical wood pulps, especially sulphite pulp, the alpha-cellulose estimation has become a quality test. The chemical properties of an over-bleached pulp are manifested in not only a higher reducing capacity (copper number), but also in a much lower alpha-cellulose content. It may be stated, in general, that when the cellulose or other constituents of a pulp are partially oxidized or hydrolyzed, the alpha-cellulose content is decreased.

To pulp manufacturers producing sulphite pulp for conversion into viscose of rayon, the alpha-cellulose determination is of considerable value. One of the first steps in the manufacture of viscose consists in the formation of alkali cellulose by treating the pulp with sodium hydroxide. As a result of this operation, a portion of the pulp is dissolved and this soluble part usually represents a direct loss in the manufacturing process. The viscose silk manufacturer naturally is desirous of obtaining a pulp of as low alkali-soluble content as possible, and consequently indicates this fact in his specification. For the evaluation of a pulp for such purposes, the alpha-cellulose test has been widely used.

Briefly, this determination consists in exposing a small sample of pulp to the action of 17.5 per cent sodium hydroxide solution for a definite period of time, usually 30 minutes, and then washing in a certain manner. The residual fibrous mass is termed alpha-cellulose. Schwalbe [6] states that the method suffers from the fact that the reagent employed may dissolve the supposedly chemically resistant cellulose in small or large amounts, depending on the concentration and other experimental conditions. The procedure of Jentgen [8] published in 1911, is the one most used today, but so many modifications have been suggested within the past few years that concordant results between different workers are usually not possible. In order to standardize a method for the determination of alpha-cellulose in wood pulp, the German Association of Pulp and Paper Chemists and Engineers has appointed a committtee under the direction of Dr. C. G. Schwalbe, to investigate this test. A report of this committee has recently been published,[5] and with the able cooperation of several pulp mills and scientific institutions a number of alpha-cellulose methods were tested in a comparative manner. The results show that alpha-cellulose figures obtained by the different investigators using the same method may vary by several per cent. The values obtained on a certain pulp by different procedures even varied to a greater extent. This lack of duplication of results may be due to (1) the method of preparation and the size of the pulp sample for analysis; (2) the quantity of the sodium hydroxide solution used; (3) the extent of the impurities in the alkaline solution, especially sodium carbonate; (4) the time of treatment; (5) the temperature of the mixture; (6) the wetting and mixing of the fiber mass; (7) the method of removing the alkaline solution; and (8) the washing of the residue.

The Procedure of Jentgen

The original method of Jentgen [8] consists in treating 10 grams of rather coarsely divided airdry pulp with 50 cc. of a 17.5 per cent sodium hydroxide solution and disintegrating the mixture to a uniform paste in a mortar. After 30 minutes at room temperature, 50 cc. distilled water are added and the mass filtered on a suction funnel fitted with a cotton or linen filter. The residue is washed with distilled water until free from alkali, which requires 10 to 12 washings with 500 cc. portions. Finally, the alpha cellulose is soaked with hot dilute acetic acid, washed six to eight times with hot water, dried and weighed. If it is desired to report the alpha-cellulose on an ash-free basis, the residue is ashed and the proper correction made for the mineral constituents.

The procedure which has been employed by the writer for the determination of alpha-cellulose, is essentially that of Jentgen, with the following simple modifications:

(1) The pulp and alkali mixture is stirred intermittently during the 30-minute period.

(2) The pulp mass is filtered directly, with no previous addition of water, on a 9 to 10 cm. Buchner suction funnel, the fibers acting as their own filtering medium. If necessary, the filtrate may be again passed through the funnel to remove traces of fibers.

(3) The mercerizing container is rinsed and the mass given a preliminary washing with about 100 cc. of dilute (5 to 8 per cent) sodium hydroxide solution. Afterwards the washing is continued with distilled water.

(4) Forty cc. of a hot 10 per cent acetic acid solution are used.

(5) The alpha-cellulose is dried in a glass-stoppered weighing bottle at 105 degrees C. to constant weight.

The degree to which the determined values duplicate each other when this modified procedure is used, is illustrated by the following figures in Table 1, taken from analyses made by the writer on some domestic and foreign bleached sulphite pulps, and purified cotton celluloses.

* Member, TAPPI; Hammermill Paper Company, Erie, Pa.

[1] Cross and Bevan, "Researches on Cellulose," III, 1905-10.
[3] Robinoff, Dissertation, Darmstadt, 1912.
[4] Lenze, J.prakt. Chem., 101, 313 (1920-21).
[4] Committee Report, Ind. Eng. Chem. 15, 748 (1923); Corey and Gray, Ind. Eng. Chem., 16, 853, 1130 (1924.)
[6] Schwalbe, Papierfabr., 23, Tech. Wiss. Teil 607 (1925)
[8] Jentgen, Kunststoffe, 1, 165, (1911); Schwalbe, "Chemische Untersuchung pflanzlicher Rohstoffe," Berlin, 1920, 30; Schwalbe and Selber, "Betriebskontrolle in der Zellstoff und Papier Industrie," 2nd edition, Berlin 1922, 221.

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TABLE 1

Sample	Alpha-Cellulose (Moisture-free basis) Per cent	Average	Maximum Deviation from Average	Deviation Per cent
1. American pulp	86.24 86.43	86.34	0.10	0.117
2. American pulp	86.61 86.75	86.68	0.07	0.081
3. American pulp	86.55 87.01	86.78	0.23	0.265
4. Canadian pulp	85.39 85.52	85.46	0.07	0.082
5. Canadian pulp	87.42 87.44	87.43	0.01	0.011
6. Canadian pulp	87.50 87.96	87.73	0.23	0.262
7. Swedish pulp	86.97 87.15	87.06	0.09	0.097
			Average.....	0.13
8. Purified cotton	98.97 99.04	99.91	0.04	0.040
9. Purified cotton	99.20 99.50	99.35	0.15	0.152
10. Purified cotton	98.84 98.96	99.12	0.07	0.071
			Average.....	0.09

The percentage maximum deviation from each average alpha-cellulose value in Table 1 amounted to 0.13 per cent, while for the purified samples of cotton cellulose this figure was 0.09 per cent.

The data in Table 2 has been taken from Doctor Schwalbe's recent thorough report[8] to show the degree of concordance to be expected when different modifications of the Jentgen procedure are used, namely, the Waentig method[7] and the one proposed by the German committee.[9] Each value in the following table represents the average of seven tests (moisture and ash-free basis) carried out by different analists. In addition to the maximum deviation in per cent alpha-cellulose from the average value as given, the percentage maximum deviation has been calculated. For the Jentgen method this value is 1.20 per cent; for the Waentig method, 3.01 per cent; and for the Committee method, 1.77 per cent.

TABLE 2

	Jentgen Method			Waentig Method			Committee Method		
Sample	Alpha-Cellulose Per ct.	Max. Deviation	Deviation Per ct.	Alpha-Cellulose Per ct.	Max. Deviation	Deviation Per ct.	Alpha-Cellulose Per ct.	Max. Deviation	Deviation Per ct.
I. Viscose pulp	87.37	0.96	1.10	84.45	4.13	4.90	85.65	1.36	1.58
II. Viscose pulp	88.16	1.08	1.22	85.28	2.02	2.37	86.01	1.62	1.88
III. Viscose pulp	89.70	0.83	0.93	87.71	1.86	2.12	87.95	1.42	1.61
IV. Viscose pulp	87.65	1.35	1.54	84.54	2.23	2.64	85.21	1.71	2.01
		Average	1.20		Average	3.01		Average	1.77

The German Committee advise that the Jentgen procedure is the most reliable alpha-cellulose method at the present time.

Suggested Modifications

Many suggestions and modifications of this procedure have recently been made. Opferman[8] and others recommend a more finely-divided pulp sample, since a more uniform mercerization results, but Schwalbe[8] cautions against the use of rasped pulp on account of its partial solubility in the alkaline solution. The ratio of the weight of the sample in grams to the volume of the mercerizing solution in cubic centimeters has been varied considerably from time to ime. Jentgen uses the 10:50 ratio. Cross and Bevan[9] use a 5:50 ratio, and later[10] change to 10:50. Mahood and Cable[11] and others[12] of the Forest Products Laboratory at Madison employ the former Cross and Bevan ratio, 5:50. In a recent article[13] on a volumetric method for the estimation of alpha-cellulose, the ratio is increased to 1:25. Waentig[7] employs a 3.5:50 ratio, and Bronnert[7] uses the same. The former prefers a smaller sample to secure a more drastic action of the alkali, thus corresponding more nearly to industrial operations. He observed that a pulp, which yielded 84.0 per cent alpha-cellulose by the Jentgen method, contained only 81.8 per cent when treated with four times the quantity of mercerizing liquor. The importance of the relation of the alkali to the pulp is thus shown.

The temperature factor in the alpha-cellulose determination does not appear to have been thoroughly investigated, except that Waentig[14] found that a low temperature of reaction gave the best results; room temperature gave consistent value. Schwalbe[8] states that the alkali and pulp mixture is very sensitive to heat and recommends a constant temperature of 20 degrees C. The preliminary washing of the pulp with a dilute alkaline solution is advised by Waentig and others. This treatment tends to prevent the precipitation of alkali-soluble substances which otherwise might precipitate when water is directly added to the alkaline solution before filtration.

Chemical Composition of Sulphite Pulp

The chemical composition of a bleached sulphite pulp varies in some measure with the cooking and bleaching processes, and may be defined with refernce to the following so-called constants:[15]

Copper number, per cent furfural, per cent pentosan, per cent wood gum, methyl number, and the per cent alpha-cellulose, as well as other tests. Schwalbe and Becker[16] cite the data, reproduced in Table 3 for the composition of bleached Ritter-Kellner pulp.

TABLE 3

Sample	Ash %	Copper No.	Furfural %	Pentosan %	Methyl No.	Wood Gum %	Alpha-Cellulose %
1. Bleached Ritter-Kellner pulp	0.5	2.9	2.3	4.0	1.3	7.2	86.6
2. Refined sulphite pulp	0.5	1.2	2.5	4.2	1.4	—	87.7

The significance of each test will be briefly considered.

The ash content is an indication of the thoroughness of the pulp washing operations and depends on the purity of the water used. The copper number is an expression of the oxidized, hydrolyzed, and other wise degraded constituents of the pulp. The original Schwalb copper number method[16] is most generally followed in pulp testing, using either the gravimetric procedure for ascertaining the amount of cuprous oxide precipitated by the Fehling's solution, or, preferably, the more rapid volumetric modification of Haegglund.[17] Recently this method has been investigated by Staud and Gray,[18] who have proposed a modification which is claimed to produce more precise results. According to Wenzl[19] the over-bleaching of fibers in a weakly alkaline oxidizing solution is shown equally well by the copper number test or the determination of the fiber strength, but when the bleaching operation occurs in a strongly alkaline solution, the alkaline exerts a pronounced solvent action on the over-bleached fiber constituents. The resulting copper number is small, but the fiber strength is markedly decreased and in this case is regarded as a better test for the detection of bleach damages.

Furfural values are indicative of the extent to which the cooking and bleaching processes have removed the pentosan constituent of he hemi-celluloses originally present in the wood. The wood gum extract is a measure of the alkali-soluble substances in the pulp, a dilute alkaline solution being employed as the solvent. The methyl number indicates the amount of residual lignin present, and the alpha-cellulose value has already been considered.

[8] Loc. cit.
[7] Waentig, Zellstoff u. Papier, 2, 225 (1922).
[8] Opfermann, in Schwalbe, "Chemische Untersuchung pflanzlicher Rohstoffe," Berlin, 1920, 50.
[9] Cross and Bevan, "Paper-Making," 1916, 97.
[10] Cross and Bevan, "Paper-Making," 1920, 103.
[11] Mahood and Cable, J. Ind. Eng. Chem., 14, 727 (1922).
[12] Sherrard and Blanco, J. Ind. Eng. Chem., 14, 64, (1922).
[13] Bray and Andrews, J. Ind. Eng. Chem., 15, 378 (1923).
[14] Waentig, Zellstoff u. Papier, 2, 12 (1922).
[15] Schwalbe and Becker, Zellstoffchemische Abhandlungen, 1, 42, (1920).
[8] Loc. cit.
[7] Loc. cit.
[16] Schwalbe and Sieber, "Betriebskontrolle," Etc., Berlin, 1922, 230.
[17] Haegglund, Papierfabr, 17 301, (1919) Schwalbe and Sieber, "Betriebskontrolle," etc., Berlin, 1922, 236.
[18] Staud and Gray Ind. Eng. Chem. 17,741 (1925).
[19] Wenzl, Wschl. Papierfabr 56 904, 1024, (1925).

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This discussion of the chemical composition of sulphite pulp has been given to facilitate a more complete understanding of a recent study[*] concerning the behavior of bleached pulp when repeatedly treated with mercerizing liquor. Schwalbe and Becker showed that when the alpha-cellulose determination was applied to wood pulp, the pentosan and residual lignin constituents chiefly were removed. The alpha-cellulose was found to be completely resistant to the further action of mercerizing liquor. The pulp, in other words, contained much more alkali-soluble material than was indicated by the initial alpha-cellulose determination. Whether this material was originally present in the pulp or was formed as a result of the first alpha-cellulose test, has not been shown. The data in Table 4 are given by Schwalbe and Becker.

TABLE 4

Sample	Ash %	Copper No.	Furfural %	Methyl No.	Alpha-Cellulose %
1. Bleached Ritter-Kellner pulp	0.55	2.56	2.21	1.16	86.56
2. Alpha-Cellulose from pulp 1	0.03	0.62	1.66	0.25	93.94
3. Refined pulp	0.46	1.42	2.04	1.72	90.56
4. Alpha-Cellulose from pulp 3	0.10	0.84	1.02	0.84	95.93

It has already been stated that the designation alpha-cellulose is a term without scientific foundation. From the available information, it would appear that the alkali extraction of wood pulp leaves a residual cellulosic material which is not a homogeneous substance, but an undefined mixture, probably consisting of a large amount of cellulose with small amounts of hemi-celluloses (hexosans and pentosans), ligneous material, and mineral and resinous substances. Since the alpha-cellulose determination is of considerable commercial importance in the evaluation of sulphite pulps, especially for the manufacture of viscose, it seems desirable to standardize on a definite procedure of analysis. This problem is already receiving international consideration, for not only is a committee of German scientists, representing the German Association of Pulp and Paper Chemists and Engineers, and the German Chemical Society, investigating several methods of analysis, but in this country the Cellulose Division of the American Chemical Society has a committee on the alpha-cellulose determination. This committee is now functioning under the direction of Dr. George J. Ritter, of the Forest Products Laboratory, Madison, Wisconsin.

As a member of the Cellulose Committee of TAPPI, the writer wishes to make a plea for the support of this work of the American Chemical Society by the members of this Association. It does not seem necessary, or feasible, to appoint a special committee to investigate the alpha-cellulose determination as applied to wood pulp, but rather to co-operate with the Cellulose Division of the American Chemical Society to the extent of assisting in the many laboratory tests which will probably be required, and making recommendations as may be desirable. Pulp manufacturers, especially those who sell their product for viscose silk, either in this country or abroad, will likely benefit most from the results of such a systematic examination of this test. In presenting this paper, it is the purpose of the writer to point out the significance of the alpha-cellulose determination, the necessity for its investigation, and the agencies which are at present working on the problem.

[*] Schwalbe and Becker Zellstoff in Papier 1 93 (1921).

Power Requirements of Paper Machines

By S. A. Staege *

This paper is intended to be the first of a series of papers on the general subject of "The Power Requirements of Paper Mill Machinery."

On account of the general interest in paper machine drives at the present time and the fact that a very considerable amount of test data is now available on practically all kinds of paper machines, it seems fitting that the paper machine should be taken up as the first machine to be considered in this series.

Exact Analysis Possible Only Recently

It is only within recent years that an exhaustive and exact analysis of the power requirements of paper machines has been possible. Under the regime of mechanical drive it was with great difficulty that the power requirements of the various sections of a paper machine could even be approximately estimated and even the power input to the entire machine, proper, could only be approximated on account of the uncertain and varying mechanical losses in the transmission medium.

The variable speed transmission, at one time common but seldom now found in use, but which was necessary in connection with the constant speed engine or motor, was generally a large consumer of power and the mechanical transmission systems even now in use on many paper machines unavoidably introduce certain power losses. In fact, it is, of course, well known that any kind of power transmission is a source of a certain amount of unavoidable loss, unfortunately as that fact may be.

We are principally concerned, however, in this discussion with the power requirements of the paper machine as a whole and the power requirements of the individual section.

Inasmuch as electrical sectional paper machine drive gives us a pretty accurate record of the power actually taken by the various sections, we have at once the basis of a fairly comprehensive analysis and the groundwork on which to build future observation.

* Member TAPPI—General Engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

A Basis for Test Data

To afford a basis for considering the test data to be presented so as to quickly get a mental picture of the relations at least approximately as they are, the following general statements may be made with respect to the machine and its individual sections.

Neglecting the power losses in the transmission system, the power required to drive a paper machine varies substantially directly as the width and as the paper speed, the number and characteristics of the sections being the same, with the following exception.

At very low speeds an adequate oil film may not be maintained on the journal bearings of some parts of the paper machine and therefore the torque may be and usually does go up at extremely low speeds. The exact speed at which markedly inadequate lubrication occurs, varies depending upon the diameter of the drier journals, the bearing area presented, the weight, kind of lubrication used, temperature and other factors. Increased torque frequently begins in the case of drier sections at speeds of 100 or approximately 150 feet per minute, and increases as the speed goes down.

Torque is practically constant except at very low speeds unless affected by variations in lubrication, variations in the weight of the sheet, variations in suction on flat boxes, variations in weight on presses and calenders, water in driers or other irregular conditions.

At the dry end of the machine, the load on one section may be affected by the pull of the sheet from another section or on another section.

The diameter of drier rolls or other rolls does not seem to affect the load appreciably for a given paper speed.

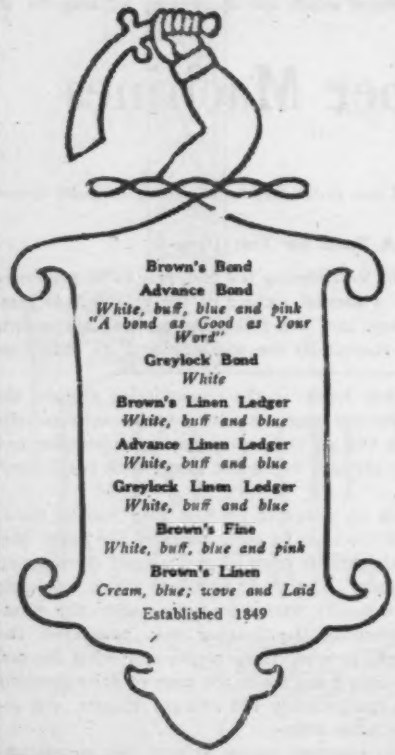
The type and adjustments of the drier steam joints have an

Build on Quality

IN making paper, quality is the recognized foundation of enduring strength and performance.

And in marketing paper, this factor is an equally essential basis of permanent success.

Just as true quality always means greater lasting properties in paper, so in marketing it usually means more dependable, enduring trade.



For 77 years, the L. L. Brown mills have specialized in making ledgers, linens and bonds of the highest quality and value. During this three-quarters of a century, L. L. Brown papers have been the acknowledged standard in their respective grades.

Business built on L. L. Brown quality has a time-proven foundation of permanence.

Special orders requiring ledger, linen or bond paper of the highest quality receive careful and prompt attention.

L. L. Brown Paper Company

Established in 1849

Adams, Berkshire County, Mass.

L. L. BROWN'S Ledgers, Linens and Bonds

Power Input to Sectional Electrically Driven Fourdrinier Paper Machines

KW. Per Inch Width Per 100 Ft. Per Minute

No.	Type	Width In.	Kind of Paper	Speed F.P.M.	Couch	1st Press	2nd Press	3rd Press	4th Press	1st Drier Section	1st Drier Per Roll	2nd Drier Section	2nd Drier Per Roll	3rd Drier Section	3rd Drier Per Roll	1st Calender	2nd Calender	Reel	Generator Output
1	Four	234	News	850	0.032	0.015	0.020	0.020	....	0.021	0.0009	0.021	0.0009	....	.....	0.029	....	.....	0.154
1	Four	234	News	785	0.037	0.012	0.020	0.019	....	0.042	0.0018	0.007	0.0003	....	.....	0.033	....	.....	0.178
2	Four	234	News	825	0.041	0.023	0.018	0.019	....	0.017	0.0008	0.017	0.0008	....	.....	0.023	....	0.0062	0.166
3	Four	234	News	670	0.029	0.017	0.013	0.013	....	0.019	0.0009	0.013	0.0006	....	.....	0.026	....	.....	0.129
4	Four	166	News	1007	0.052	0.036	0.017	0.016	0.014	0.053	0.0013	....	.....	....	.....	0.026	....	0.0026	0.197
4	Four	166												5th Press					
5	Four	166	News	1000	0.045	0.033	0.029	0.028	0.033	0.026	0.0011	0.040	0.0017	0.019	.....	0.036	....	0.0096	0.300
6	Four	164	News	1026	0.038	0.011	0.009	0.014	....	0.026	0.0011	0.042	0.0018	....	.....	0.015	....	0.0046	0.164
7	Four	164	News	1012	0.066	0.036	0.021	0.029	....	0.044	0.0018	0.039	0.0016	....	.....	0.041	....	0.0055	0.280
7	Four	164	News	970	0.042	0.032	0.024	0.025	....	0.039	0.0016	0.031	0.0013	....	.....	0.060	....	0.0056	0.239
7	Four	164	News	950	0.048	0.030	0.021	0.026	....	0.035	0.0014	0.039	0.0016	....	.....	0.038	....	0.0061	0.228
7	Four	164	News	930	0.048	0.042	0.023	0.032	....	0.039	0.0016	0.050	0.0019	....	.....	0.032	....	0.0048	0.241
7	Four	164	News	900	0.052	0.036	0.020	0.027	....	0.034	0.0014	0.036	0.0015	....	.....	0.061	....	0.0058	0.247
7	Four	164	News	850	0.063	0.033	0.016	0.022	0.021	0.054	0.0023	0.049	0.0021	....	.....	0.046	....	0.0069	0.287
7	Four	164	News	815	0.063	0.035	0.015	0.018	0.020	0.052	0.0022	0.057	0.0024	....	.....	0.056	....	0.0077	0.299
7	Four	164	News	785	0.059	0.035	0.016	0.018	0.019	0.058	0.0024	0.051	0.0021	....	.....	0.054	....	0.0067	0.287
7	Four	164	News	745	0.047	0.033	0.014	0.014	0.016	0.040	0.0017	0.049	0.0022	....	.....	0.056	....	0.0053	0.257
7	Four	164	News	700	0.045	0.032	0.015	0.016	0.018	0.042	0.0017	0.039	0.0016	....	.....	0.051	....	0.0068	0.251
7	Four	164	News	667	0.049	0.035	0.013	0.016	0.016	0.045	0.0019	0.047	0.0020	....	.....	0.046	....	0.0058	0.255
7	Four	164	News	630	0.049	0.032	0.015	0.020	0.018	0.042	0.0018	0.044	0.0018	....	.....	0.058	....	0.0061	0.259
8	Four	164	News	740	0.041	0.033	0.022	0.021	0.015	0.016	0.0008	0.014	0.0007	....	.....	0.032	....	0.0066	0.194
9	Four	160	News	706	0.042	0.019	0.028	....	....	0.025	0.0021	0.023	0.0020	0.012	0.0010	0.035	....	0.0089	0.177
10	Four	158	News	738	0.035	0.028	0.023	0.025	....	0.016	0.0010	0.019	0.0012	....	.....	0.035	....	0.0060	0.199
10	Four	158	News	735	0.037	0.028	0.023	0.025	....	0.016	0.0010	0.017	0.0011	....	.....	0.035	....	0.0047	0.193
10	Four	158	News	725	0.042	0.028	0.024	0.022	....	0.017	0.0011	0.014	0.0009	....	.....	0.033	....	0.0045	0.197
10	Four	158	News	715	0.044	0.028	0.025	0.022	....	0.017	0.0011	0.016	0.0010	....	.....	0.035	....	0.0051	0.197
10	Four	158	News	673	0.043	0.028	0.031	0.028	....	0.020	0.0012	0.020	0.0012	....	.....	0.033	....	0.0043	0.201
10	Four	158	News	669	0.045	0.028	0.033	0.028	....	0.016	0.0010	0.018	0.0011	....	.....	0.036	....	0.0045	0.199
10	Four	158	News	650	0.045	0.033	0.028	0.022	....	0.020	0.0012	0.020	0.0012	....	.....	0.029	....	0.0030	0.194
10	Four	158	News	637	0.048	0.029	0.034	0.022	....	0.019	0.0012	0.019	0.0012	....	.....	0.033	....	0.0035	0.198
11	Four	156	News	1010	0.054	0.024	0.025	0.022	....	0.025	0.0011	0.025	0.0011	....	.....	0.017	....	0.0072	0.200
11	Four	156	News	750	0.045	0.037	....	....	....	0.040	0.0018	0.014	0.0006	....	.....	0.030	....	0.0056	0.175
12	Four	156	News	1005	0.051	0.025	0.015	0.017	....	0.026	0.0013	0.029	0.0015	....	.....	0.025	....	0.0051	0.195
12	Four	156	News	803	0.050	0.023	0.009	....	0.024	0.028	0.0014	0.027	0.0014	....	.....	0.020	....	0.0075	0.196
13	Four	156	News	1000	0.058	0.028	0.017	0.020	....	0.026	0.0013	0.029	0.0015	....	.....	0.024	....	0.0086	0.221
13	Four	156	News	760	0.052	0.033	0.024	....	0.019	0.030	0.0015	0.025	0.0013	....	.....	0.029	....	0.0063	0.206
14	Four	156	News	980	0.047	0.022	0.015	0.017	....	0.031	0.0016	0.030	0.0015	....	.....	0.025	....	0.0063	0.199
14	Four	156	News	800	0.046	0.027	0.028	....	0.026	0.025	0.0013	0.025	0.0013	....	.....	0.023	....	0.0085	0.216
15	Four	154	News	740	0.042	0.028	0.023	0.023	....	0.022	0.0013	0.022	0.0013	....	.....	0.035	....	0.0059	0.197
16	Four	166	Book	400	0.041	0.017	0.026	....	....	0.027	0.0017	0.024	0.0015	....	.....	0.035	....	.....	0.179
16	Four	166	Book	400	0.042	0.016	0.020	....	....	0.023	0.0014	0.021	0.0013	....	.....	0.031	....	.....	0.163
16	Four	166	Book	400	0.051	0.018	0.030	....	....	0.023	0.0014	0.018	0.0011	....	.....	0.033	....	.....	0.184
16	Four	166	Book	400	0.053	0.023	0.030	....	....	0.034	0.0021	0.032	0.0020	....	.....	0.036	....	.....	0.201
16	Four	166	Book	350	0.057	0.020	0.025	....	....	0.033	0.0020	0.033	0.0020	....	.....	0.043	....	.....	0.218
16	Four	166	Book	330	0.051	0.021	0.027	....	....	0.035	0.0022	0.035	0.0022	....	.....	0.047	....	.....	0.221
16	Four	166	Book	300	0.045	0.018	0.035	....	....	0.046	0.0028	0.046	0.0028	....	.....	0.050	....	.....	0.241
16	Four	166	Book	260	0.043	0.016	0.032	....	....	0.037	0.0023	0.037	0.0023	....	.....	0.043	....	.....	0.243
17	Four	152	Book	400	0.055	0.014	0.013	....	....	0.020	0.0014	0.031	0.0022	....	.....	0.028	....	.....	0.174
18	Four	152	Book	400	0.063	0.005	0.015	....	....	0.015	0.0011	0.018	0.0013	....	.....	0.036	....	.....	0.181
19	Four	116	Book	205	0.059	0.021	0.025	0.034	....	0.059	0.0020	....	.....	....	.....	0.042	....	.....	0.214
20	Four	98	Book	450	0.051	0.031	0.028	....	....	0.035	0.0023	0.037	0.0025	....	.....	0.043	0.040	.....	0.265
20	Four	98	Book	425	0.052	0.033	0.029	....	....	0.032	0.0021	0.032	0.0021	....	.....	0.045	0.037	.....	0.246
20	Four	98	Book	400	0.031	0.026	0.028	....	....	0.024	0.0016	0.030	0.0020	....	.....	0.036	0.034	.....	0.214
20	Four	98	Book	389	0.043	0.023	0.031	....	....	0.017	0.0011	0.020	0.0013	....	.....	0.022	0.031	.....	0.201
20	Four	98	Book	380	0.047	0.024	0.023	....	....	0.019	0.0013	0.020	0.0013	....	.....	0.024	0.036	.....	0.200
20	Four	98	Book	375	0.038	0.029	0.027	....	....	0.028	0.0019	0.031	0.0021	....	.....	0.038	0.043	.....	0.237
20	Four	98	Book	350	0.034	0.025	0.039	....	....	0.022	0.0015	0.031	0.0021	....	.....	0.041	....	.....	0.198
20	Four	98	Book	296	0.065	0.029	0.029	....	....	0.017	0.0011	0.018	0.0012	....	.....	0.025	0.040	.....	0.229
21	Four	90	Book	225	0.075	0.014	0.028	....	....	0.047	0.0017	....	.....	....	.....	0.066	....	.....	0.235
22	Four	174	Kraft	697	0.031	0.019	0.010	0.011	....	0.031	0.0016	0.024	0.0012	....	.....	0.012	....	0.0077	0.153
22	Four	174	Kraft	660	0.030	0.015	0.015	0.015	....	0.045	0.0023	0.030	0.0015	....	.....	0.023	....	0.0060	0.181
22	Four	174	Kraft	641	0.029	0.017	0.011	0.010	....	0.037	0.0018	0.020	0.0010	....	.....	0.009	....	0.0069	0.161
22	Four	174	Kraft	600	0.044	0.015	0.015	0.015	....	0.042	0.0021	0.018	0.0009	....	.....	0.011	....	0.0061	0.176
22	Four	174	Kraft	540	0.023	0.012	0.012	0.015	....	0.028	0.0013	0.019	0.0010	....	.....	0.019	....	0.0068	0.167
22	Four	174	Kraft	520	0.028	0.019	0.011	0.012	....	0.034	0.0017	0.029	0.0015	....	.....	0.017	....	0.0016	0.178
22	Four	174	Kraft	450	0.031	0.012	0.016	0.015	....	0.031	0.0015	0.015	0.0008	....	.....	0.020	....	0.0092	0.164
22	Four	174	Kraft	400	0.027	0.015	0.014	0.017	....	0.038	0.0019	0.024	0.0012	....	.....	0.015	....	0.0015	0.171
22	Four	174	Kraft	330	0.037	0.020	0.019	0.016	....	0.041	0.0021	0.018	0.0009	....	.....	0.039	....	0.0041	0.175
22	Four	174	Kraft	303	0.027	0.015	0.015	0.015	....	0.034	0.0017	0.008	0.0004	....	.....	0.032	....	0.0097	0.163
22	Four	174	Kraft	270	0.034	0.017	0.014	0.019	....	0.035	0.0018	0.018	0.0009	....	.....	0.030	....	0.0056	0.173
22	Four	174	Kraft	202	0.032	0.015	0.017	0.015	....	0.034	0.0017	0.012	0.0006	....	.....	0.019	....	0.0103	0.164
23	Four	168	Kraft	350	0.032	0.019	0.010	0.010	....	0.034	0.0017	0.034	0.0017	....	.....	0.025	....	0.0120	0.177
23	Four	168	Kraft	365	0.031	0.018	0.010	0.010	....	0.033	0.0017	0.033	0.0017	....	.....	0.024	....	0.0110	0.170
24	Four	161	Kraft	650	0.021	0.015	0.013	0.011	....	0.023	0.0006	....	.....	....	.....	0.019	....	0.0075	0.111
24	Four	161	Kraft	350	0.024	0.016	0.017	0.016	....	0.015	0.0004	....	.....	....	.....	0.038	....	0.0180	0.109
24	Four	161	Kraft	277	0.015	0.020	0.014	0.013	....	0.013	0.0004	....	.....	....	.....	0.051	....	0.0091	0.124
24	Four	161	Kraft	225	0.017	0.017	0.013	0.019	....	0.017	0.0005	....	.....	....	.....	0.057	....	0.0150	0.124
25	Four	136	Wrapping	455	0.035	0.027	0.019	0.030	....	0.028	0.0008	....	.....	....	.....	0.039	....	.....	0.174
25	Four	136	Wrapping	400	0.043	0.039	0.021	....	....	0.037	0.0011	....	.....	....	.....	0.032	....	.....	0.178
25	Four	136	Wrapping	365	0.032	0.021	0.018	0.019	....	0.042	0.0012	....	.....	....	.....	0.040	....	.....	0.173
25	Four	136	Manila	335	0.043	0.030	0.026	0.024	....	0.026	0.0008	....	.....	....	.....	0.032	....	.....	0.174
25	Four	136	Manila	300	0.043	0.029	0.032	0.029	....	0.016	0.0005	....	.....	....	.....	0.059	....	.....	0.174
25	Four	136	Manila	275	0.045	0.034	0.027	0.026	....	0.024	0.0007	....	.....	....	.....	0.056	....	.....	0.178
25	Four	136	Manila	260	0.035	0.021	0.021	0.029	....	0.025	0.0008	....	.....	....	.....	0.035	....	.....	0.176
25	Four	136	Manila	220	0.059	0.027	0.019	0.029	....	0.014	0.0004	....	.....	....	.....	0.051	....	.....	0.187
25	Four	136	Manila	205	0.052	0.031	0.020	0.036	....	0.014	0.0004	....	.....	....	.....	0.052	....	.....	0.188
25	Four	136	Manila	190	0.043	0.026	0.018	0.028	....	0.015	0.0005	....	.....	....	.....	0.058	....	.....	0.177
26	Four	124	Glassine	232	0.049	0.014	0.020	0.022	0.014	0.024	0.0009	....	.....	....	.....	0.024	....	.....	0.166
27	Four	116	Bond	400	0.040	0.024	0.009	0.007	....	0.018	0.0011	0.007	0.0004	....	.....	0.011	0.014	0.012	0.154
27	Four	116	Bond	400	0.021	0.026	0.009	0.008	....	0.017	0.0010	0.012	0.0007	....	.....	0.003	0.020	0.013	0.151
27	Four	116	Bond	389	0.039	0.024	0.010	0.008	....	0.017	0.0010	0.013	0.0008	....	.....	0.006	0.016	0.015	0.153
27	Four	116	Bond	350	0.036	0.033	0.012	0.007	....	0.017	0.0010	0.008	0.0005	....	.....	0.007	0.035	0.015	0.153
27	Four	116	Bond	250	0.042	0.024	0.009	0.007	....	0.015	0.0009	0.004	0.0002	....	.....	0.006	0.020	0.014	0.156
27	Four	116	Bond	230	0.044	0.022	0.013	0.007	....	0.012	0.0007	0.008	0.0005	....	.....	0.014	0.028	0.011	0.155
27	Four	116	Bond	225	0.052	0.031	0.010	0.006	....	0.012	0.0008	0.004	0.0002	....	.....	0.010	0.021	0.012	0.156
27	Four	116	Bond	225	0.042	0.038	0.010	0.008	....	0.015	0.0009	0.006	0.0004	....	.....	0.017	0.025	0.009	0.157
28	Four	90	Wall	520	0.036	0.024	0.026	0.021	....	0.045	0.0013	....	.....	....	.....	0.036	....	.....	0.188

TECHNICAL SECTION, PAGE 108

IN a business so diversified, it is always difficult to keep the range of our work and products before the Trade. With operations beginning with lumbering, and ending with such refinements as embossing and color-printing, small wonder that sometimes our oldest friends go elsewhere for goods they would be only too glad to buy from us. Below you will find brief reminders of the more important Union Lines.

Paper

"Drum Head Kraft" Wrapping Paper, 25-80 lbs., basis. On special order, Drum Head Kraft can be furnished in striped form or with individual marking, and in almost any color.

"Sachem Fibre," 25 lbs., and 30 lbs., basis only; a natural dry-finish, all Sulphite wrapper, popular in many trades.

Specialties: Various special papers can be furnished upon request, in both Kraft and Sulphite, including a line of Bleached Sulphite Papers, in White and Colors, 25-80 lbs., basis. Notion Envelope, Black and Gasket Papers; Papers for Waterproofing, Waxing and Twisting; etc.; etc.

Paper Bags

Grocers' Bags, including the well-known Animal Line of "Not-A-Seam" Automatics. Carton-Liner, Candy, Notion, Bread, Sandwich, Pastry, Cake, Doughnut, Glassine, Potato Chips, Peanut, Bacon & Lard-Liner, Nail, Sugar, Banana, Millinery, Shirt, Shirtwaist; Handle, Garment, and Cigar & Tobacco Bags; *The* UNION DUPLEX COFFEE BAGS; *The* UNION SHOPPING BAG. Widest facilities for the designing and manufacture of Special (made-to-order) Paper Bags, and two of the most complete printing-plants in the industry.

Paper Sacks

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effect on the drier load.

The number and pressure of doctors affect the load noticeably.

The kind of felt roll and table roll bearings affect the load as well as the type and design of main bearings.

The number of suction boxes and the kind of fourdrinier wire and weave sometimes have a marked affect on the load.

The weight and freeness of the sheet and the vacuum on the flat boxes affect the power requirements.

In the case of cylinder machines, the number of cylinder molds and thickness of sheet affect the load materially.

There seems to be no very noticeable average difference in load between a suction type of couch or press type couch section.

Suction press rolls appear on the average to take somewhat less power than regular presses.

The number and diameter of table rolls have considerable effect on the load. Large diameter and smaller number of table rolls reduce the load.

While the power for driving paper machines varies greatly on different machines, and on the same machine at different times, at the same speed and on the same width basis and comparison otherwise, average figures can be given which are quite representative of a large number of machines as indicated by many power readings at different speeds over a wide range and on widely differing widths of machines and of different types and makes.

A Table for Practical Comparison

In order that a practical comparison can be made the following table is submitted which gives a good average in terms of kilowatt input to the section motors per inch width of machine per 100 feet paper speed, and also the input to the entire machine in the case of the average fourdrinier paper machine. The figures given represent the input to the direct current driving motors in the case of sectionally driven paper machines so that the values indicated are higher than the net input to the section by the amount of losses in the driving unit.

SECTION	Kw. per in. width per 100 f.p.m. speed
Couch—Suction type	.042
Couch—Press type	.046
1st Press—Suction type	.017
1st Press—Regular type	.025
2nd Press—Regular type	.021
3rd Press—Regular type	.020
Drier rolls, each	.0018
Calender stack—Average number rolls	.034
Reel-Uniform speed type	.006
Average total for average machine	.200

The total load for the machine will, of course, vary depending upon the number of sections as well as other factors enumerated, and the load on any section to 25 per cent or even 50 per cent greater than the foregoing in some cases.

It should be observed and will be shown later that there are frequently wide differences in power consumption under apparently similar conditions. It might also be observed that the power requirements of paper machines of the latest designs are in general appreciably lower than has been the case in the older machines, and that the test figures presented in the tables which follow as well as in the preceding table are based upon all classes, types, sizes, speeds and kinds of machines at present equipped with electrical sectional drive.

In the case of cylinder board machines and especially at very low speeds, the load may be as much as 100 per cent higher than the foregoing figures. In the case of calender sections and in addition there are a number of sections not enumerated in the table including breast roll, cylinder molds, primary presses, baby presses, cutters, etc.

Table of Typical Power Readings

There is given a table of typical power readings on a number of types, sizes and speeds of paper machines equipped with electric sectional drive and wherein the readings given indicate the electrical input to the section driving motors and the generator output in the case of the entire machine.

In order to make a direct comparison the electrical input to the section driving motor is given in terms of kilowatts per inch width of machine per 100 feet per minute paper speed.

Bleach Washing on Vacuum Drum Washers

By H. A. Morrison *

After pulp has been bleached, it is necessary to thoroughly wash out all residual bleach together with all of the soluble products of bleaching, before the pulp can be made into paper.

The water soluble impurities in bleached pulp are usually reported as chlorides in terms of calcium chloride. This is not strictly accurate, since the products of bleach action include, in addition to chlorides, soluble oxychlorides and limited amounts of various other colorless water soluble compounds. However, the proportion of chlorides present in pulp parallels the other soluble impurities and pulp low in chlorides is also low in all other solubles.

In the present discussion, the degree of pulp purity is expressed in grains of chlorides per gallon, in terms of $CaCl_2$, based on pulp at 5 per cent air dry density.

Removal of soluble impurities from bleached pulp prevents foaming at the paper machines and gives a permanently white sheet which will not turn yellow with age.

Poorly washed bleached pulp when made into laps soon shows a yellow to light brown discoloration along the edges where the impurities are concentrated by capillarity and evaporation.

Good washing promotes increased production on a paper machine, decreases the alum-sizing requirement, and by eliminating foam, removes the most common cause of breaks on the paper machine. Thus it pays to produce clean stock on all grades, and good washing pays even in mills where all of the stock bleached is slushed and immediately converted into paper.

Certain mills purposely leave traces of bleach in the stock because the chlorine prevents slime growth in the paper machine circuit, being a bacteriacide.

The merest traces of chlorine will accomplish this in most cases and close washing of bleached pulp to less than 5 grains chlorides per gallon can best be done on vacuum drum washers.

Equipment

The vacuum drum washer consists of a cylinder which revolves upon two trunnion bearings, partially submerged in stock at 2 per cent or lower density, the latter being contained in a suitable vat so arranged that the drum is 60 per cent submerged when the vat is full of stock.

The materials of construction are bronze, cast iron, wood and monel metal and the depreciation on the equipment is conservatively figured at 7½ per cent per year.

The revolving drum is divided into 18 separate filtering sections, each of which is positively controlled and automatically regulated by a filter valve. Each section has separate outlets of cast iron or bronze through which the water and air drawn through the wire cloth cover of the drum pass to the filter valve and then to waste.

Stuffing boxes are provided for each main trunnion, so there is no leaking of stock such as occurs on the ordinary cylinder washer.

The monel or brass 40 to 60 mesh wire cloth cover is rigidly

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supported upon wood or metal screen and held in place by external spiral wire winding. Ordinarily wire 0.085 in. dia. is used and spaced 1 in. centers. This external wire winding holds the wire cloth firmly in place, protects it from the wear of the doctor, prevents stretching and distortion when the cloth is washed or cleaned by blowing from within by steam or air and permits quick and permanent repairs by patching when a cover is beginning to fail or has been damaged by accident or carelessness.

Methods of Operation

Bleached stock is thinned to 2 per cent or less, to as low as 0.3 per cent by addition of paper machine white water or return bleach water and sent to the washer. Under 10 in. vacuum sheet formation on the drum is extremely rapid, being practically coincident with submergence of the bare cloth. This explains the surprisingly sharp separation of solids from liquids, characteristic of this type of washer.

The drum is operated at about 40 ft. peripheral speed per minute and the sheet formed averages over 1 in. thick. After the cake emerges above the stock level of the vat, there follows a brief interval during which the sheet is reduced to approximately 10 per cent air dry density.

Ordinarily the bleach washer can be placed at a plant in the mill where there exists at least 20 ft. vertical fall measured from the center of the drum to the mill basement. When so placed, the flow of filtered water through the vertical barometric leg induces the requisite 8 to 10 in. vacuum on the bleach washer and makes a vacuum pump, with attendant power and upkeep charges, unnecessary. In such an installation, the only accessory equipment needed is a speed reduction set with direct connected 2 or 3 hp. motor, used to revolve the washer drum at speeds not greater than 2 r.p.m.

When sufficient fall does not exist, a small rotary wet vacuum pump is used. In general the washed stock leaves the washer at 4 to 5 per cent air dry density so that very little air need be drawn through the sheet for drying purposes, and the vacuum pump is small, with low power consumption. Ordinarily 20 hp. will provide the needed displacement and drive a washer which handles 100 tons of soda pulp per 24 hours, to approximately 10 per cent air dry. It is thus clear that fully 80 per cent of the soluble impurities left in the stock by bleaching have been removed before any wash water is used.

Clean fresh water is next applied to the cake by means of a brass weir placed above and close to the drum. The sheet of wash water from the weir extends across the full length of the drum and strikes the cake a few inches behind the top center line of the drum and the chloride free water so applied replaces the moisture in the cake so exactly that the volume of fresh water needed to effect practically perfect displacement is only slightly greater than the volume of impure water so removed.

It is to be understood that there is no diffusion or mixing or channelling of wash water in the pulp cake. The fresh water simply travels into the pulp and the moisture there present is removed by the vacuum maintained beneath the layer of pulp. If too little fresh water is applied there is a sharp line of demarcation between the outer washed portion and the inner layer of unwashed stock.

This method of washing depends upon the displacement and is to be compared with drainers and with cylinder washers where solubles are removed by dilution and by subsequent thickening.

Stock at 10 per cent b. d. density has 1.195 gallons of water present for each bone dry pound of pulp. The exactness of the displacement washing method is clearly shown, when practical operation averages less than three gallons of fresh water per pound of pulp to produce stock that contains less than three grains of chlorides per gallon at 5 per cent a. d. density. This includes the water used for thinning washed stock to 5 per cent a. d. density. The older methods, such as washing in beaters, in drainer pits, or in multiple cylinder washers, seldom use less than 10 and often as much as 15 gallons of fresh water to produce washed stock of the above purity.

The advantages of bleach washing on vacuum drum washers may be summarized as follows:

(1) Important saving of fresh water.
(2) Stock losses reduced to minimum.
(3) Simplifies mill flow sheet by combining bleach washing, white water recovery, and thickening all in one operation.
(4) Produces uniformly well washed pulp.

Application

The vacuum drum washers are now widely used upon all varieties of bleached pulp, including soda, sulphite, and reclaimed book stock. The general method of operation is the same, but capacity, proportion of water required, final cake moisture and clarity of effluent filtered water, all vary on the different varieties of pulp, being influenced mainly by fiber length and stock freeness.

Sulphite capacity is greatest, running over 1,000 lb. per sq. ft. of filter area per 24 hours, while on the less free soda pulp, capacity is around 800 lb., and on the still slower old magazine pulp capacity falls to 400 lb. The figures given are for clean stock with no paper machine white water and are reduced by addition of white water since the short solids in white water greatly reduce stock freeness.

Mill superintendents often argue that stock losses when washing bleached sulphite by the older methods are slight and this is true. On the other hand, when bleached sulphite is washed on vacuum drum washers, stock losses are practically nil and the other advantages such as water economy and white water recovery fully justify the adoption of the improved methods.

On soda pulp bleach washing, losses are serious where the dilution system is used and the advantages of the vacuum drum are more important because of the additional stock saved.

In one large soda mill, two 8 by 10 ft. vacuum drum washers handle 100 to 120 tons per day and incidentally clarify all the white water from a large battery of paper machines. At that mill the washed stock contains 5 per cent clay filler, recovered from the white water and chlorides are reduced to 3 grains per gallon. The clarified water leaving the washer averages 0.2 lbs. total solids per thousand gallons.

At a mill which deinks old magazines and after screening the deinked pulp, washes it by the system, one 8 by 10 ft. washer handles 40 to 60 tons per day and discharges it at 5 per cent a.d. density containing only the slightest trace of chlorides. The washed stock averages 6.37 per cent clay and the filtrate goes to waste containing 0.5 lb. total insolubles per 1,000 gallons. The stock goes to the washer at 0.3 to 0.5 per cent a.d. direct from the flat screens and filtrate amounts to more than 1,600 g.p.m.

If fairly uniform conditions as to dilution and rate of flow of stock sent to the washer are maintained, fresh water or white water can be added as the washed stock is discharged and uniform stock chest density maintained.

In most cases it is best to send the washed stock through a Trimbey or other form of density regulator to insure uniformity ahead of the beaters.

VACUUM DRUM BLEACH WASHING

	Sulphite	Soda	Old Book
Unwashed Pulp—			
Density per cent a. d. entering washer	1.4	1.71	0.4
Grains chlorides as CaCl, per gal. @ 5% a. d.	335.0	75.0	25.0
Grains chlorides per a. d. lb. pulp	670.0	150.0	50.0
Per cent chlorides in stock in washer	4.47	1.07	0.35
Washed Pulp—			
Grains chlorides per gal. @ 5% a. d.	2.6	3.0	trace
Grains chlorides per a.d. lb. pulp	5.2	6.0	trace
Per cent chlorides in washed stock storage	0.052	0.06	trace
Per cent clay filler on weight a.d. pulp		5.0	6.37
Water Used—			
Gals. chloride free water per lb. pulp (a)=	2.0	1.5	1.0
(a) Gal. wash water (b) gal. dil. water (b)=	1.0	2.0	3.0
Capacity a.d. lb. per sq. ft. per 24 hours	1000	800	400
Lb. actual solids per 1000 gal. filtrate	0.1	0.2	0.5

TECHNICAL SECTION, PAGE 110

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Hardinge System of White Water Treatment

By Noel Cunningham *

Design of plant for handling papermill white water involves the following considerations:

1—Good fiber should be saved and the formation slime prevented.

2—Separation of fiber should be controllable.

3—Decomposition of fiber should be preventable.

4—Slime should be eliminated in a form convenient for disposal.

5—The largest possible proportion of water should be recoverable for reuse.

6—Stream pollution should be prevented.

This paper describes a plant designed with these objects in mind.

Fig. 1 shows the principle of operation. Two machines successfully used in metallurgical ore dressing: one, a filter-thickener and the other a filter-clarifier, are combined in a single rectangular tank. A division wall in the center separates the rectangular tank into two square compartments. This division wall is vented near the top, so as to allow a surface flow only from one tank into the other. White water is admitted into the first compartment, or thickener, behind a baffle which forces the incoming flow to a considerable submergence. Sedimentation occurs, assisted by a bottom filter action on which can be controlled to effect greater or less deposition of fiber. Overflowing into the second compartment, or clarifier, the water, freed from suspended fiber, carries off slime and other undesirable elements. Here sedimentation assisted by a comparatively large bottom filter action produced by a strong pump suction, collects most of the remaining solids in a cake on the filter surface.

The principle and construction of both thickener and clarifier are identical. In each a shaft, the upper portion of which is threaded, is slowly rotated. Rigidly attached to the bottom of the shaft is a deep spiral, the bottom edge of which is provided with a saw steel cutting blade. Each of the two square compartments is filled in to compose a cylindrical bottom portion. In this cylindrical bottom is a filter of fine sand supported on about 10 inches of coarse and intermediate rock with a dressing of fine rock.

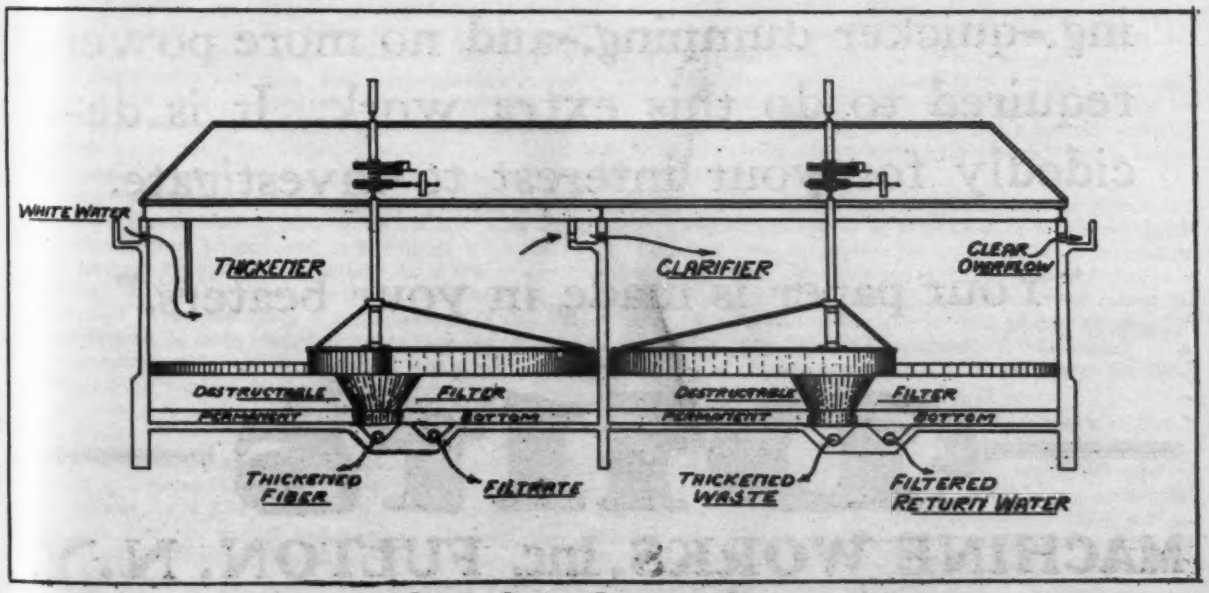
The Thickener

The manipulation of the thickener differs from that of the clarifier. In the thickener compartment, the spiral is maintained in continuous slow rotation about 2 inches away from the filter surface. The settling fiber is drawn for return to the process to a central outlet, and a filter action is maintained through the sand filter by a goose neck which can be raised or deflected as required to regulate flow through the bed of sand; this flow gravitates to a bottom outlet distinct from that provided for the thickened fiber. In the space between the bottom of the spiral sweep and the sand filter surface, fiber will deposit; at first this will oppose little obstruction to the flow through the bottom, but it will become more compact and necessitate deflection of the goose neck to increase static head. At intervals the compact fiber must be cut away. This is done by engaging a micrometer control on the drive mechanism which gradually lowers the spiral sweep as it rotates. As soon as the spiral has cut away the compact fiber and has reached the sand surface, the spiral is raised to its original position. In this way, not only is obstruction to proper filter action removed, but by cutting at sufficiently frequent intervals, decomposition of fiber is prevented.

After a time the sand surface will become clogged and static head required to maintain filter action will become excessive. It has been found that surface penetration of the sand occurs only to the depth of average diameter of sand particles, and that to completely restore full filter action, using ordinary sand, a surface cut of about 0.02 inches is sufficient. To make a sand cut, the compact fiber is cut away as described, but, instead of raising the spiral when the sand surface is reached, the spiral sweep is given two complete rotations at the sand surface, then, still in rotation, it is allowed to continue its down travel another 0.02 inches. At the same time the discharge from the pump is diverted to deliver into the clarifier compartment instead of back to the mill. The

* Member TAPPI; Engineer, Hardinge Co., York, Pa.

[1] See Chem. Met., Sept., 1925 and Exm. J. P., May 30, 1925 for fuel description.



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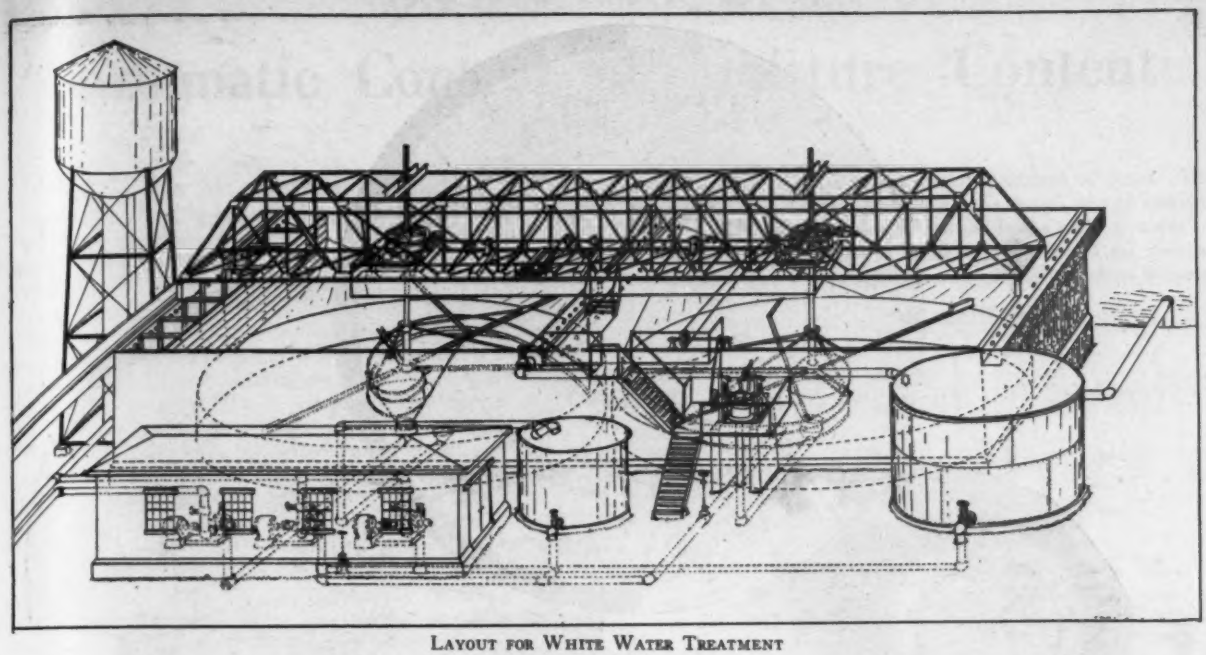

LAYOUT FOR WHITE WATER TREATMENT

spiral is then raised 2 inches, and, allowing sufficient time for the pump to remove all sand particles, the cycle is resumed. By cutting away 0.02 inches of the destructible sand filter whenever clogging occurs, its action will remain constant indefinitely, a foot of sand bottom being good for from three to five years.

The clarifier compartment action differs from that in the thickener in that a sticky material difficult to filter is to be removed and at the same time most of the water must be taken out through the sand filter bottom. The bottom outlet for the filtrate is connected to a centrifugal pump suction, the pump being set well below the water level in the tank. About 1 square foot of filter surface is provided per gallon per minute flow and the tank is allowed to overflow all across the end opposite the center division, which separates the thickening from the clarifying compartment. The discharge valve of the centrifugal pump is set to deliver whatever quantity of water is necessary in order that combined overflow and sand-filtered effluent may be satisfactory for reuse in the mill. No definite rule can be laid down for this, as requirements are variable. When very clean water is needed for the showers and slimy water is satisfactory in the beaters the filtered water combined with makeup water may be delivered through one system, while a separate pump and piping system serves the beaters.

In the clarifier compartment the spiral sweep is rotated only at such times as the sand filter surface becomes clogged to a point where insufficient water is being drawn through. The centrifugal pump is then stopped and back flow of water from storage is returned through the suction pipe for a few moments to fill the sand voids. This softens the skin of slime which clogs the sand surface. The spiral sweep is then rotated twice with the micrometer feed set to make about 0.02 inches sand cut. Filtration is then resumed as before. In general, in normal operations, a sand cut will be required in the clarifier compartment about once in 36 hours, a foot of sand filter bottom being sufficient for about two years.

Fig. 2 shows a complete system of white water treatment along the above lines. Depending upon the requirements, this plant would be suitable for a flow from 2 to 4 million gallons daily. The tank is 80 feet long and 40 feet 6 inches wide inside, and the division wall provides two 40 by 40 foot compartments. Depth from the top of tank to top of cylindrical portion is 9 feet to allow a minimum slope in the corners of 55 degrees. The cylindrical bottoms are 4 feet deep to allow 3 feet of destructible sand filter.

White water from the mill enters through 4 inch pipes set along the top of the wall at one end of the thickener compartment across this end, 3 feet in, is a baffle 7 feet deep. This is an important feature and assures practically complete coagulation of the incoming fiber. Travelling through the thickener compartment much of the fiber is deposited on the bottom and is drawn to the center by the spiral sweep. At the center is a 65 degree sloping funnel maintained in the sand by the well scraper which rotates with the mechanism. From the center the thickened fiber is removed by centrifugal pump and may be returned to the beaters or direct to the machines. Control of the amount of filtrate through the sand filter bottom affects the proportion of fiber in the return; ordinary sedimentation will compact the fiber to about 0.7 per cent dry weight and the filter action will further compact it to a maximum, in ordinary practice, of about 1.25 per cent. Normally this would be about 1 per cent.

Overflow from thickener compartment is through 4 inch pipes set in the top of the division wall and a launder is provided for the purpose of diverting the overflow in case it becomes necessary to empty the clarifier compartment while still maintaining flow to the thickener.

Separate pumps are shown for handling clarifier filtrate and overflow and these should be so piped up as to be interchangeable in case one is down for repairs. A diaphragm pump arranged to drive from the line shaft common to the thickener and clarifier is shown for pumping out the sludge accumulated from cutting the clarifier filter surface. The material will amount to about 16 cubic feet per day and can be pumped off thick enough to be readily handled by conveyor or truck and can be used for filling low ground.

This plant will cost, erected, about $30,000, as shown in Fig. 2, complete except water tower. By substituting two individual wood stave concrete bottom tanks in series for the all concrete construction a saving of approximately $6,000 in cost of installation may be effected. At two million gallons per day it will require about 150 horse power to operate, of which all but five will be pumping, and at four million 225 horse power will be required. one attendant can handle operation.

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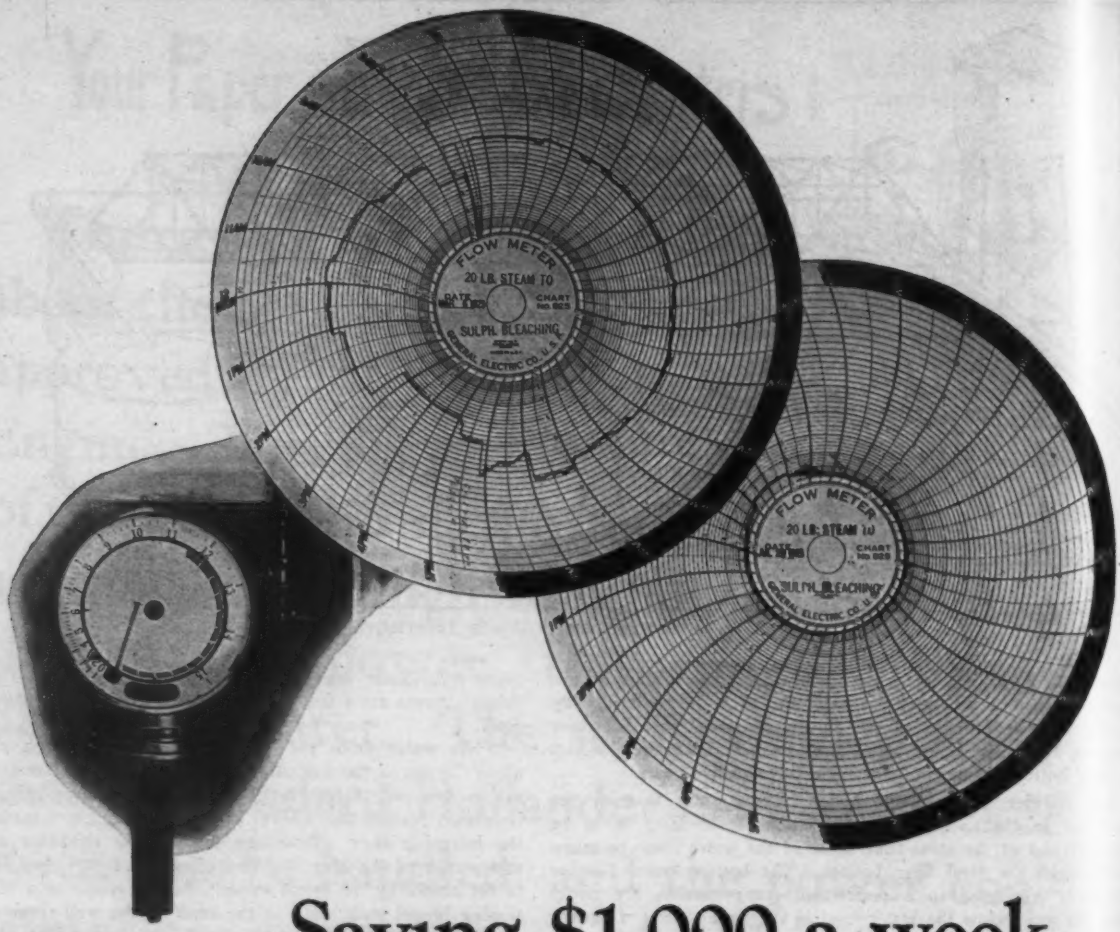

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Automatic Control of Moisture Content

By A. R. Harvey *

So much has been said and written on the desirability of an instrument for indicating and recording the moisture content of paper while it is being made, that it seems hardly necessary to do more than mention some of the advantages to be had from its use. Among these advantages are economy in steam consumption by the driers, elimination of breaks caused by over-drying, greater production brought about by the inclusion of the proper amount of moisture in the paper and a more satisfactory product because of its uniformity.

Since it is well recognized that the above results can be readily obtained with the aid of an accurate moisture indicator, no further discussion of them will be included here.

The following briefly describes the writer's method and apparatus used automatically to indicate, record and control the percentage of moisture in paper. Before proceeding with a description of the device itself, let us consider an analogy which will serve to illustrate the principle involved. Supposing a stream of water is allowed to fall upon a plate heated, for convenience, by electricity. For the purposes of this experiment, we will suppose the heat is supplied to the plate at a constant rate and that the temperature of the water as it leaves the faucet remains unchanged. Under these conditions, the temperature assumed by the surface of the plate will be a function of the quantity of water flowing. That is, the greater the flow of water, the lower the temperature of the plate and vice versa. Now if the initial temperature of the water rises one degree, the temperature of the plate will also rise one degree approximately. By substituting a thermocouple for the thermometers, placing the hot junction so as to assume the same temperature as the plate, and immersing the cold junctions in the water above the

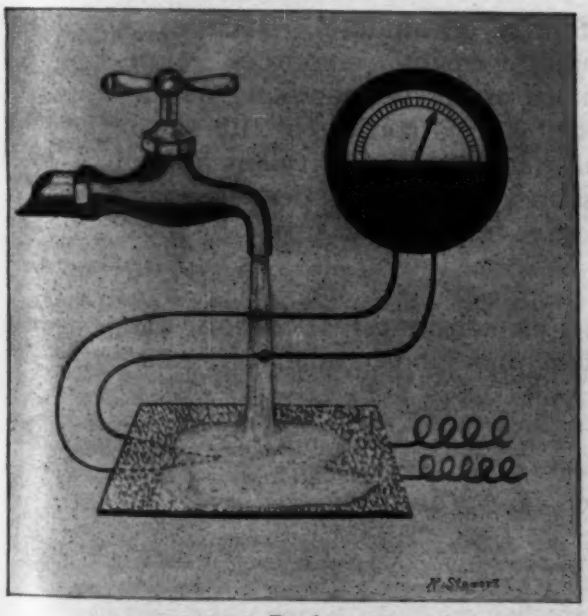

FIG. 1

plate, we have measured the difference in temperature between the water and the hot plate. With this arrangement, we have compensated, within certain limits, for any change in temperature of the water flowing to the plate and a galvanometer, properly calibrated, will show the quantity of water flowing. Fig 1.

Fig. 2 shows, diagrammatically, a roll embodying this same principle for use in determining the moisture content of paper. The roll is divided into a number of sections as shown, one of which is heated by a resistance unit placed on the inside. The quantity of heat supplied to this section is regulated by means of the rheostat and wattmeter as shown, and because of the insulation between

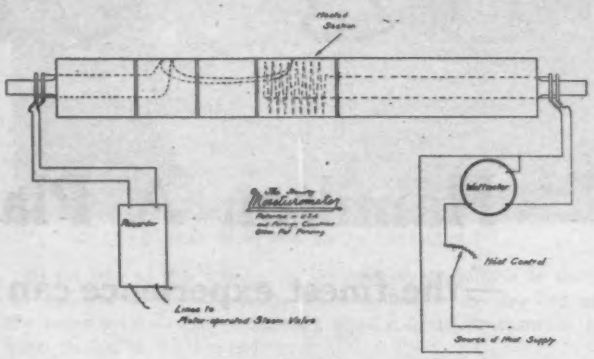

FIG. 2

this and the adjacent sections, all this heat must be carried off by the paper in contact with the heated section.

For any given set of conditions where the speed of the paper, its thickness and weight are kept reasonably uniform, the rate of electrical energy to be supplied to the roll is adjusted to the correct

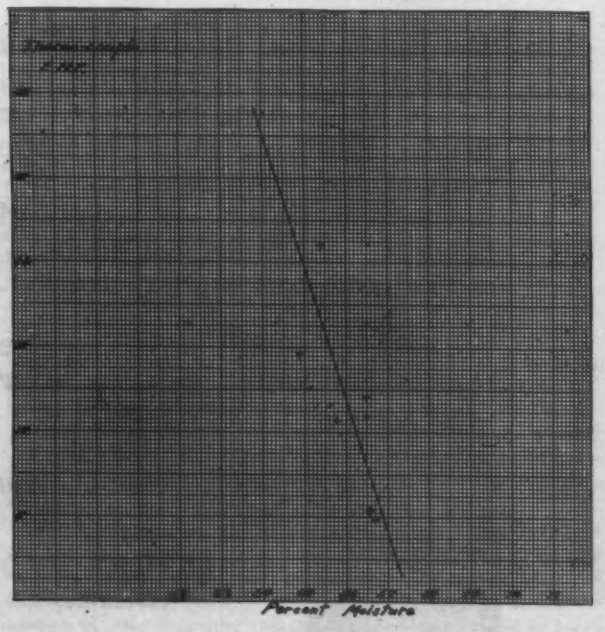

FIG. 3

amount and held constant. The heated section will then assume a definite temperature corresponding to that at which the heat carried away by the paper equals the heat supplied. Now if the paper coming on to the roll becomes dry for any reason, it can no longer carry away heat as it did, and the temperature of the heated section rises. However, as the temperature rises, the rate of heat flow to the paper increases until quilibrium is again reached and the input becomes equal to the output.

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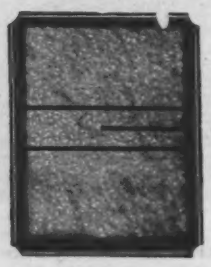

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During this time, changes in the temperature of the paper as it comes to the roll are compensated for in exactly the same way as in the water and hot plate analogy described above.

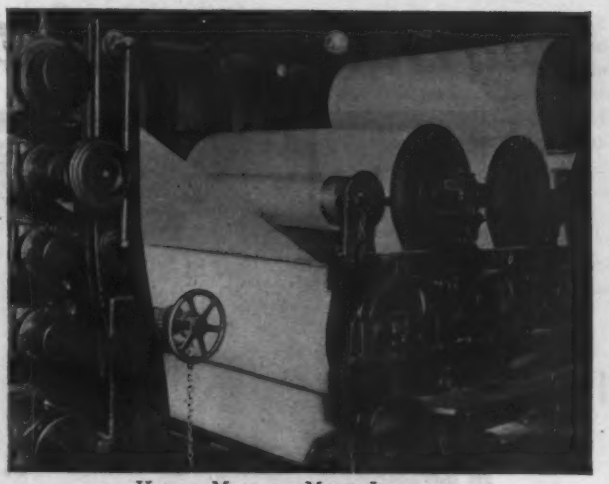
Other factors being held constant, it is thus seen that the temperature of the heated section is a function of the moisture carried by the paper.

The e.m.f. produced by the thermo-couple is directly proportional to the difference in temperature between the heated section of the roll and that which is allowed to assume the temperature of the paper coming to the roll. This e.m.f. is shown on a galvanometric recorder which is calibrated directly in percentage moisture of the paper.

Obviously, during a break in the paper, heat is no longer carried away from the roll although the heat input is unchanged. As a protective measure, a relay is operated by the recorder which opens the heating circuit when the roll temperature becomes too high as it would otherwise do under these circumstances. As soon as paper is again running over the roll, the heat is automatically turned on.

The results of some tests, made while the device was in operation on the wet end of a board machine, are shown graphically in Fig. 3. The actual moisture content was determined in the laboratory from samples. The moisture content as found was then plotted against readings of the galvanometer. These tests were made at different dates and while running different gauge boards, but all were taken at a speed of 130 ft. per min. Similar curves are obtained for other speeds.

From these curves is determined the proper amount of heat to supply for any given speed, which is the only adjustment required.



HARVEY MOISTURE METER INSTALLED

At the time of this writing, no information is available to show the accuracy of the instrument when applied to the dry end of the paper machine but preliminary tests indicate its accuracy is equal to that at the wet end.

It is planned to operate a motor controlled steam valve in such a way that the recorder will automatically hold the moisture content of the paper to any predetermined amount.

Report of Heat, Light and Power Committee

By R. W. Leeper,* Chairman

Early in the year, it was decided that the Heat, Light and Power Committee would not take an active part in the fall meeting at Kalamazoo through the presentation of formal papers, but should cooperate, as far as possible, with the Paper Drying Committee on the closely allied subject of Paper Drying and Methods of Steam Distribution and Air and Condensate Removal. This policy was carried out although it is feared the burden was largely on the latter committee, due to unavoidable absence of a majority of this committee's members.

For the Annual Meeting a number of subjects received consideration, including those suggested by several interested members besides the committee, which evidence of more than a passing interest is here gratefully acknowledged. Of the subjects considered, three have been elected for this meeting—first, Power and Process Steam from Higher Pressures; second, Power Requirements of Papermaking Machines; and third, The Identification of Pulp and Paper Mill Piping.

Higher Pressures Coming

For new developments, where the entire or an appreciable portion of the power demand is generated with steam, it appears that pressures are gradually being increased, although very slowly when compared with central station practice. During the last few years, one of the several factors entering into the reduction from 20,000 to 14,000 B.t.u. per kilowat hour in the large central station has been constantly increasing steam pressures and higher temperatures in the interim. A corresponding increase over present overall efficiencies in pulp and paper mill power houses may not be practical, but there is certainly room for improvement, and Mr. Darling, in his paper, has shown what may be accomplished with certain assumed conditions.

Power Requirements of Papermaking Machines is a subject of general interest, and also one that usually starts a discussion, as until the advent of motor drive such demands were largely provided for by scientific guesswork. With the more general use of motor drive, these demands have been determined, and Mr. Staege has presented some very useful data on this subject.

Identification of Piping AESC Code

The Identification of Pulp and Paper Mill Piping has received much attention, and several mills have developed systems applying to their particular requirements but as yet there has been no real attempt at standardization in our industry. Further, from the inquiries your Secretary and this committee have received, it would appear that many were interested, and at the fall meeting in Kalamazoo, it was decided to prepare a tentative code for presentation at the spring meeting.

The American Engineering Standards Committee, fostered by the national engineering societies, has been working on a code covering the Identification of Piping for several years, and, while it has been formally presented, it has not been accepted. It was the opinion of your committee that our tentative code should be based upon that already prepared, and quite generally recognized. Therefore, a preliminary code, covering the piping commonly found in pulp and paper mills, has been prepared by P. H. Glatfelter as an appendix to the AESC Code, and will be submitted for discussion.

The AESC, knowing the Technical Association was interested in this subject, requested that a member be appointed to represent this association on its committee, and P. H. Glatfelter, the author of our tentative code, was appointed.

* Member TAPPI; Engineer with H. S. Taylor, Dayton, Ohio.

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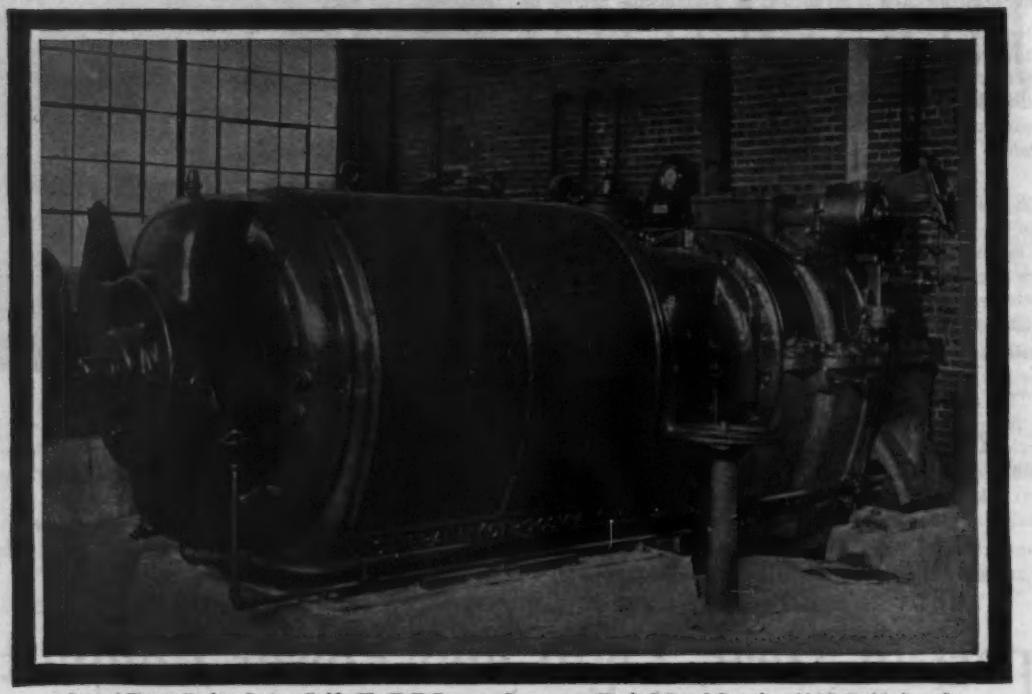

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For some time, there has been a rather insistent demand that the Heat, Light and Power Committee start some work of general interest that would require the work of several committees to complete, and it was with this in mind that our second and third subjects were selected.

It is obviously impossible, in one paper of limited length, for Mr. Staege to cover the subject of Power Requirements of Papermaking Machinery. It can, however, be covered in sections, and if carried to its logical conclusion, with revisions when and as may be required, should prove to be a valuable contribution.

With respect to the tentative code for the Identification of Piping, while conditions are somewhat different than for the preceding, it is believed that the best efforts of more than one committee will be required to place it in acceptable form. This seems a particularly safe assumption when the work required in connection with the Drying Code is recalled.

From a power standpoint, there have been no especially outstanding developments in the pulp and paper industry during the past year, in your chairman's opinion. For some of the new all-steam mills, central station practice, where feasible, has been followed to some extent. It is also believed that more and more attention, and properly so, is being given to steam and power generation and distribution, with net results that must have been gratifying to more than one executive. Further, it is your chairman's opinion that in this field as in perhaps no other part of the average mill, will careful selection, together with correct layout and scientific operation, show as satisfactory returns from the standpoints of continuity of service and cost.

A Small Constant Humidity Testing Cabinet

Progress Report of the Development of a Conditioning and Testing Cabinet and Its Adaptation to the Folding Test

By F. T. Carson *

Because of its hygroscopic nature paper varies in its content of moisture according to the hygrometric state of the atmosphere. And the amount of moisture associated with the fibers of paper influences their strength, their flexibility, their surface friction, their ease of wetting, and all those physical properties of the fibers which combine to determine the strength and other physical properies of the paper. Since the physical properties of paper are influenced to a large extent by the hygrometric state of the atmosphere surrounding it, the attempt to test paper with respect to these physical properties without consideration of the hygrometric state of the surrounding air leads to data which are inaccurate and misleading. Especially is this true of the folding test. The effect of the hygrometric state is so considerable upon this test of paper that the results are practically valueless unless the tests have been carried out under carefully controlled conditions designed to maintain in the paper a content of moisture in equilibrium with a known, definite hygrometric state of the atmosphere.

Not a Simple Problem

It has been found that, over the usual range of laboratory temperatures, the variations in moisture content of paper, and the other physical properties influenced by it, are governed by the relative humidity of the surrounding air. The necessity for testing paper in air of definite relative humidity has become generally recognized. Bu the problem of maintaining a constant relative humidity in a paper testing laboratory is not a simple one. The chief consideration is that of expense. The elaborate equipment necessary to maintain an atmosphere of constant relative humidity in a room will ordinarily cost several thousand dollars. Although such equipment capable of automatically controlling the atmosphere in a room large enough to accommodate all testing equipment and the necessary operators is highly desirable, most paper mill laboratories are without any control of relative humidity in testing owing to the excessive expense of the necessary installation. The attempt is being made by the Bureau of Standards to meet this condition by the development of a small relatively inexpensive constant humidity conditioning and testing unit. The work thus far has been confined to the use of the apparatus with the folding tester since this appears to be the most pressing need.

Apparatus and Means of Control

There are a number of means of producing and maintaining a constant relative humidity in an enclosed space. One of the simplest and most satisfactory for a small enclosure is the use of solutions of sulphuric acid. This is a well known and widely used method whereby the air to be conditioned is brought into contact with a relatively large surface of sulphuric acid of definite concentration. A sulphuric acid solution of definite concentration has a characteristic vapor pressure which is smaller the greater the concentration of acid. Hence if it is desired to produce a relative humidity of, say, 65 per cent in a small enclosure it is only necessary to choose a sulphuric acid solution of such concentration as

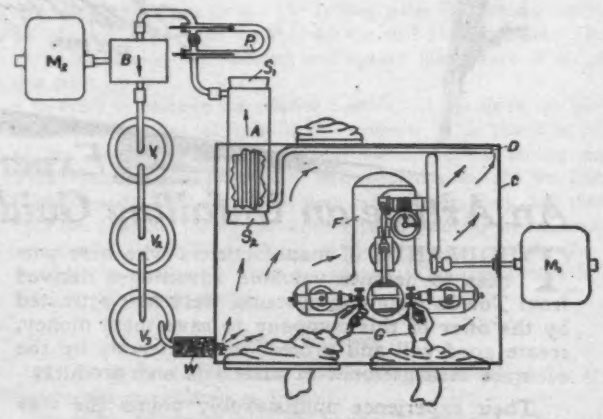
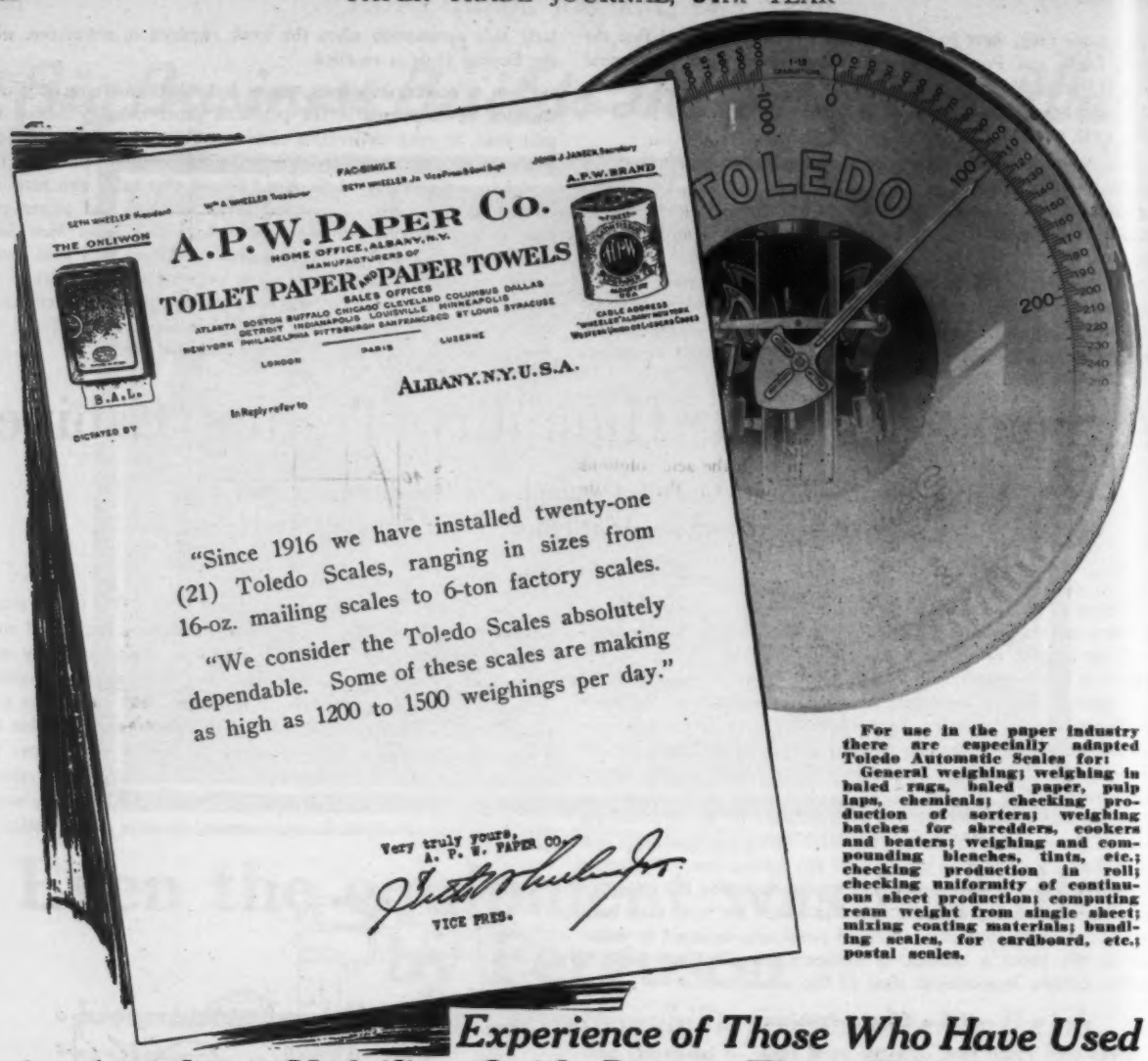


FIG. 1

will give a vapor pressure which is 65 per cent of that over pure water at the same temperature and pressure, and then to expose the air in a suitable manner to this solution. A sulphuric acid solution having the required concentration contains 36 per cent by weight of sulphuric acid and has a density of 1.267 at 25°C. The relation of the concentrations of sulphuric acid solutions to their vapor pressures has been worked out very thoroughly by several investigators and the data are available in the literature.[1] Small cabinets have previously been made using this means of conditioning the air. But when conditioned specimens were to be tested they were removed from the cabinet and the actual testing done in air at quite a different humidity from that desred. Experiments on the rapidity

* Assistant Physicist, Bureau of Standards.
[1] *See* Wilson, Jour. Ind. and Eng. Chem. Vol. 13, No. 4, (1921), p. 326, for an excellent set of curves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of interchange of moisture under such conditions have shown that such procedure is not valid.

The present design has as its object a constant humidity cabinet combined with means of carrying out the test in the conditioned air in the cabinet without opening the cabinet to the outside air at any time. Air is taken from the cabinet through a blower at the rate of about a cubic foot per minute, is bubbled through the sulphuric acid solutions and is then returned to the cabinet. The folding tester is placed inside the cabinet which normally has no communication with the outside air. The specimens are handled and the tester manipulated by means of flexible sleeves which terminate in rubber gloves into which the hands are placed. This means of handling the test specimens is entirely feasible and entails no serious difficulty, although the operation is not carried out with quite the same degree of facility as with the bare hands. The apparatus is illustrated by Fig. 1, which is a plan view showing the cabinet, C, the conditioning unit, the folding tester, F, and the rubber gloves, G. The blower, B, takes air from one corner, D, draws it through the auxiliary conditioning chamber, A, forces it through the acid solutions in the three bottles, V1, V2, and V3, and returns it to the opposite corner, E, of the cabinet. Before entering the cabinet the air passes through glass wool, W, in order to remove any entrained sulphuric acid. The cabinet is provided with a glass top in order to give an unobstructed view within. A vertical cross section of one

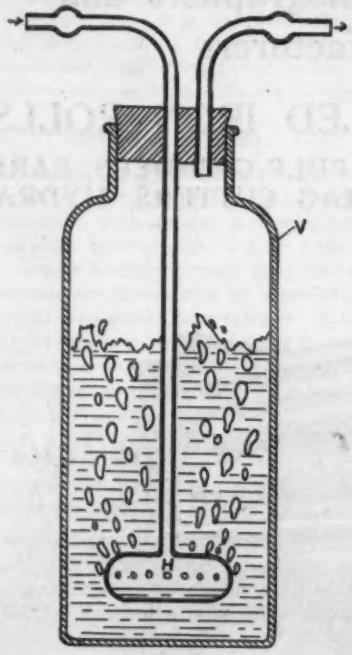

FIG. 2

of the acid bottles is shown in Fig. 2. The air is very effectually broken up and exposed to the acid by means of the bubbler, H. Manipulation of the specimens and of the tester without opening the cabinet is effected by means of the flexible gloves, G. The flexible sleeves are long enough so that one can reach any part of the cabinet.[3]

The introduction of any considerable amount of unconditioned paper into the cabinet would upset the relative humidity of the air in the cabinet as a result of the rapid interchange of moisture between the paper and air. A few folding strips thus introduced would make no serious difference. But a considerable number suddenly brought into the cabinet from the outside might easily change the relative humidity enough to make serious difficulty. In order to prevent any such occurrence an auxiliary conditioning chamber, A, (Fig. 1) is provided. This is situated in the out-going air stream and is used for bringing the test specimens to equilibrium with the air issuing from the cabinet before these specimens are brought into the testing cabinet. The figure shows a portion of the

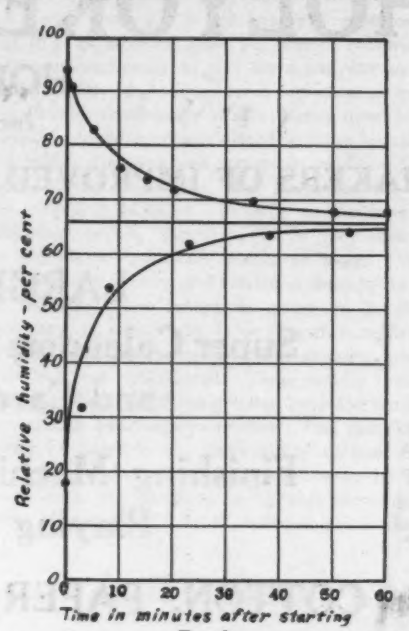

FIG. 3

auxiliary conditioning chamber cut away so as to show the test specimens within.

It is necessary that the blower and the motors be located outside the cabinet so that the temperature of the air within the cabinet will not be affected by them. The folding tester is driven by motor, M1, through a shaft passing through the wall of the cabinet. The oil in the bearing is a sufficient seal against interchange of air at this point.

In order to measure the relative humidity of the air in the cabinet any time a special form of psychrometer, P, is placed in the air line so as to measure the relative humidity of the issuing air. This psychrometer is merely a U-tube containing day and wet bulb thermometers. The air passes first over the dry bulb and then over the wet bulb. Measurement of relative humidity in this manner is valid provided the velocity of the air stream past the thermometers is at least 3 meters per second. This condition is fulfilled in the present design.

The Procedure

In testing the folding endurance of paper by means of this apparatus the procedure is as follows:

The motor M2 which drives the blower, B, is started. The air is drawn by the blower from the cabinet, forced through the sulphuric acid solution and returned to the cabinet. In passing through the acid solutions the air takes the relative vapor pressure of these solutions whose concentration is such as to give the required relative humidity. In a short time the air in the cabinet which is in constant agitation and circulation has attained the desired relative humidity. Then the test strips, which have previously been cut from the samples to be tested, are placed in a rack and inserted into the auxiliary conditioning chamber, A, by removing the stopper, S1. When the test specimens have remained in the conditioning chamber for the necessary 2-hour period of conditioning, the hands are inserted in the rubber gloves at the ends of the flexible sleeves and the stopper, S2 removed. The rack holding the test specimens is brought into the cabinet and a strip put in place between the jaws of the folding tester. After adjusting the ten-

[3] Application for patent on this testing cabinet has been made.

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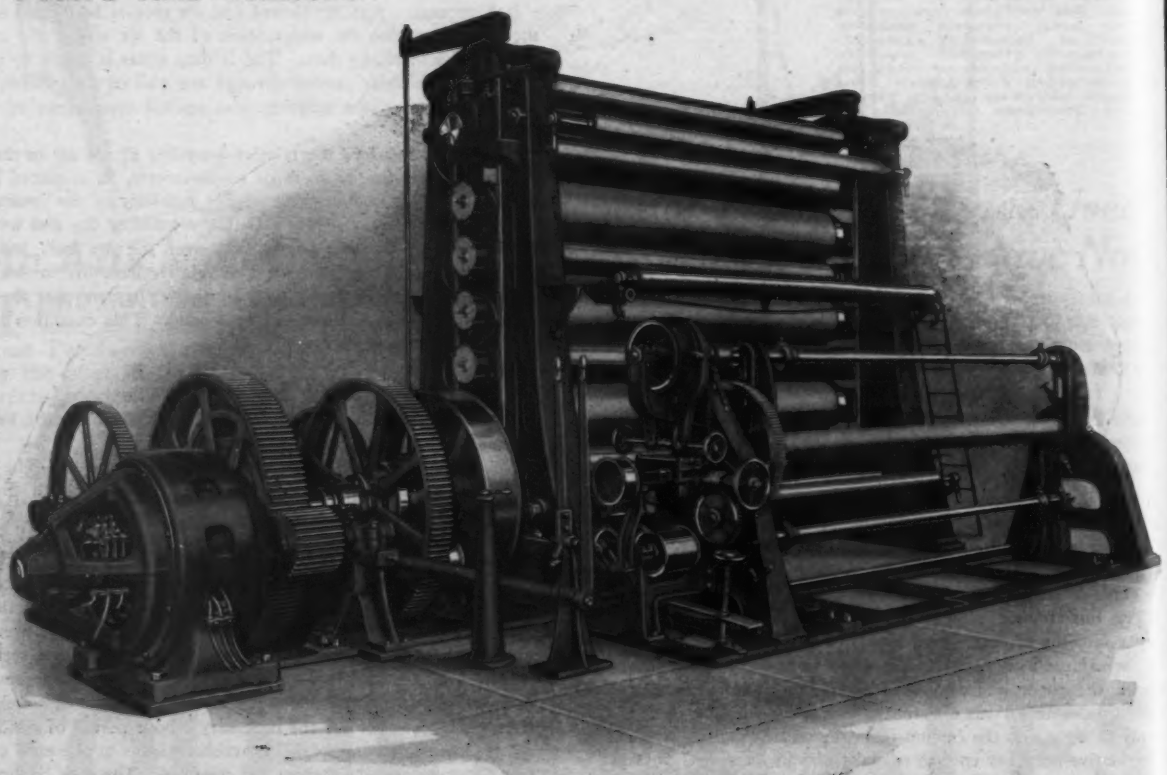

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sion and the counter the hands are removed from the gloves and the motor, M1, started from the outside. No particular difficulty is involved in handling the test specimens and manipulating the folding tester in this manner, except that the rubber gloves hamper one's ease of manipulation to the same extent that gloves do in any other operation. In warm weather the hands perspire rather freely and it is necessary to use talcum inside the gloves. The hands should not be left in the gloves longer than is necessary since the body heat tends to raise the temperature of the air.

Conditioning the Air and the Paper

By placing the U-tube psychrometer on the outlet of the last acid bottle it was found that the relative humidity of the air issuing from the solutions is in equilibrium with the relative vapor pressure of the solutions. But with the psychrometer in the position in Fig. 1 it is found that some time is required for the equilibrium to be attained. This is because the conditioned air which enters the cabinet is being mixed with that not yet conditioned and equilibrium builds up rather slowly. Theoretically the process is expressed by something like a converging infinite geometrical series. Experimental data were obtained and curves plotted, relative humidity vs. time in minutes from the instant the apparatus was started. In Fig. 3 the upper curve shows the progress of equilibration starting from a relative humidity of 94 per cent and the lower curve starting from 18 per cent, the solutions being adjusted to maintain a relative humidity of 66 per cent. It is seen that virtual equilibrium is attained in about three-fourths of an hour. This period of time, together with the 2-hour conditioning period, makes nearly three hours before actual testing can begin. But this is equally true of a humidity room.

Shortening the Time

This two--hour conditioning period can be saved, however. Paper confined in a small air-tight space cannot be affected by outside hygrometric conditions. Only changes in temperature will cause interchange of moisture between paper and the enclosed air. But since the paper contains a relatively much larger amount of moisture than the enclosed air there can be no appreciable amount of interchange provided the volume of air is small. It is only necessary to determine the minimum amount of paper per unit volume of confined air necessary to prevent more than the allowable amount of moisture interchange. A paper of the bond or writing class will contain about 8 per cent moisture at 65 per cent relative humidity. Suppose a quantity of such paper is placed in an air-tight container having a capacity of one liter, and suppose the temperature then changes from 25° C. to 10° C. The air will give up moisture to the paper.

Amount of Paper Necessary

What amount of paper is necessary in order that its moisture content will come to equilibrium with the confined air at a relative humidity of 66 per cent at the lower temperature?

The paper at 65 per cent relative humidity contains 8 per cent moisture.

The paper at 66 per cent relative humidity contains 8.1 per cent moisture.

One liter of air at 25° C. and 65 per cent relative humidity contains 0.0150 g. moisture.

One liter of air at 10° C. and 66 per cent relative humidity contains 0.0062 g. moisture.

In changing to the lower temperature, therefore, the air gives up 0.0088 g. moisture.

In changing to the lower temperature, therefore, the air gives up 0.0088 g. moisture to the paper, and this is the 0.1 per cent extra moisture in the paper when equilibrium is reached at the lower temperature, that is 0.0088 g. is 0.1 per cent of the weight of paper required to produce equilibrium at 66 per cent relative humidity. Hence $\frac{0.0088}{0.001}$ equal 8.8 grams of paper per liter of confined air is needed. This calculation neglects the fact that paper contains slightly more moisture at a given relative humidity but at a lower temperature. As a matter of fact, the final equilibrium in the above case would be nearer 65 per cent than 66 per cent relative humidity. From the above discussion it is seen that paper confined in an air-tight container in the proportion of 10 g. or more of paper per liter of confined air, will remain conditioned and ready to test from one day to the next. This proportion of paper to confined air is equivalent to one folding strip in about 10 cubic centimeters of air. Hence three folding test specimens properly conditioned and placed in an ordinary test tube closed with a rubber stopper would remain in condition for testing regardless of external conditions, that is, within the range of temperatures prevailing in doors. In order to eliminate the two-hour conditioning period, therefore, it is only necessary to prepare the test strips from one sample of paper (10 in each direction) a day ahead of time and condition them in the auxiliary conditioning chamber while testing is going on in the testing cabinet, place them in a test tube, close it with a rubber stopper, and remove them again in the cabinet next morning after the air in the cabinet has been conditioned. These twenty folding strips will be sufficient to keep the folding tester busy for the two hours required to condition additional specimens. This principle can, of course, be used for paper in any amounts for all tests in any humidity room, and is being so used at the Bureau of Standards at the present time, the condition being that there must be at least 10 grams of paper per liter of confined air in the air-tight container.

Frequency of Adjusting Concentration of Solutions

As a result of interchange of moisture between paper and the air, and then in turn between the air and the solutions as paper is continuously conditioned the concentration of the solutions is gradually changed. Occasionally it is necessary to readjust the concentration by adding acid or water as the case may be. Wilson states that the volume of the solution in the first bottle may vary 3 or 4 per cent before it is necessary to readjust the concentration of the solutions require very little attention. In the present designs men are so small that the total moisture interchange is small and the solutions. Fortunately in the present case the folding test specithe bottles are large, as it was intended to develop the cabinet for all the usual physical test, which require a relatively much larger amount of paper to be conditioned. About seven or eight liters of acid solution are used at present. This amount of solution when used only for conditioning folding test specimens would not require any adjustment in an indefinite period. But the advantage of using smaller amounts of solution will be brought out further along. One folding strip will give up to the solutions about 0.004 g. of water in being conditioned from 90 per cent relative humidity to 65 per cent, or will take up a like amount in being conditioned from 20 per per cent relative humidity to 65 per cent. Assuming 100 folding strips tested per day for six working days the amount of solution which would change 3 per cent in volume in a week would be $\frac{100 \times 0.004 \times 6}{0.03}$ equals 80 cc. required per bottle. Bottles or absorption flasks holding 100 cc. each would, therefore, be amply large for use in connection with a testing cabinet for the folding tester, the concentration of the solutions being adjusted once a week.

Adjust Solutions

It is advisable during the winter months when the moisture content of paper is low to make the concentration of the solution slightly higher than that required. For example, if the standard condition is 65 per cent it may be adjusted to give 66 per cent

[3] Jour. Ind. and Eng. Chem., Vol. 13, No. 4, p. 330 (1921)

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relative humidity. This is an advantage for two reasons. The solutions are constantly giving up water to the paper and becoming more concentrated and therefore in equilibrium with air of a lower relative humidity. Hence if they are initially adjusted to give a slightly higher relative humidity than necessary they can be used longer before the concentration is sufficiently increased to require readjustment. Another advantage is that the air in the cabinet will more quickly reach the lower limit of the allowable relative humidity variation. In summer the opposite conditions prevail and it is an advantage to adjust the concentration of the solutions to be in equilibrium with air at a relative humidity slightly below 65 per cent.

Effect of Temperature Variations

One advantage of the use of sulphuric acid solutions for controlling the moisture content of the paper to be tested is the fact that the moisture content thus maintained is not much affected by ordinary variations in temperature. If, for example, the temperature should rise, the relative humidity of the air would tend to fall and produce a smaller moisture content in the paper. But the relative vapor pressure of the sulphuric acid solution is slightly greater at the higher temperature. This results in a slightly greater relative humidity which tends to restore the moisture content. Data have not yet been obtained to determine the amount of temperature variation which is permissible but the ordinary range of indoor temperatures is probably not excessive. This constancy of moisture content equilibrium is of course contingent upon a constant temperature level throughout the apparatus. It does not matter much what the temperature is but at any particular time the solutions and the air in the cabinet must be at the same temperature.

Difficulties Discussed

The most serious difficulty which has thus far been encountered lies in the fact that with the ordinary variations in room temperatures during the day the temperature of the air in the cabinet fluctuates with that of the room, but the temperature of the solutions does not respond so readily. This results in a temperature gradient within the apparatus and if appreciable gives rise to serious error. It was found that when the temperature of the air in the cabinet is greater than that of the solutions the resulting relative humidity is lowered, and when the air in the cabinet is at a lower temperature than the solutions the relative humidity is higher than that which the solutions were intended to give. It was thought that air thoroughly broken up in passing through the solution would come to the temperature of the solution. But this was found not to be the case. Experiments were carried out by drawing air at different temperatures from the room, bubbling it through the solutions, and then measuring the temperature and relative humidity of the effluent air by means of the U-tube psychrometer. The rather curious fact developed that the air takes the vapor pressure of the acid solution, but does not take the temperature of the solution. This is evident from Table I, which gives the temperature of the admitted air, the temperature and the relative humidity of the effluent air and the vapor pressure ratio. The vapor pressure ratio is the ration of the vapor pressure of the solution at its temperature to the vapor pressure of saturated aqueous vapor at the temperature of the solutions more responsible to thermal fluctuations, thus producing a fairly even temperature throughout the cabinet in spite of temperature fluctuations outside it. If necessary, thermostatic control can also be used. Work along these lines is now under way.

TABLE 1

DATA SHOWING EFFECT OF TEMPERATURE VARIATIONS

Temperature, Centigrade			Measured	Vapor
Admitted Air °C.	Acid Solution °C.	Effluent Air °C.	Relative Humidity %	Pressure Ratio %
30.0	20.8	24.0	57	54.3
22.1	20.0	22.0	60	58.4
22.0	20.1	21.8	60	59.5
21.8	20.0	21.0	63	62.1
20.5	20.0	20.3	64	64.8
21.1	20.0	20.0	66	66.0
17.8	20.0	18.0	75	74.8
15.5	20.0	17.5	76	77.2

and this vapor pressure ration agree closely. The effect is the same as if the air came to equilibrium with the solution and then suffered a change in temperature, so that the effect is about the same, whether the temperature of the air suffers a change before or after passing through the acid solution. In order that the relative humidity shall remain within the usual allowable limits of variation the temperature of the solution and that of the air in the cabinet must at no time differ by more than half a degree centigrade.

It is felt that this difficulty arising from fluctuations in room temperature can be overcome by proper thermal insulation of the entire apparatus and the use of smaller amounts of solution. In this manner the temperature of the air in the cabinet can be made less responsive to changes in room temperature and the temperatures of the solutions more responsible to thermal fluctuations, thus producing a fairly even temperature throughout the cabinet in spite of temperature fluctuations outside it. If necessary, thermostatic control can also be used. Work along these lines is now under way.

Folding Tests

Whether or not the conditioning and testing cabinet is feasible and valid in connection with the folding tester is, of course, finally decided by the character of the results which are obtained by its use. Some comparative tests were therefore made. Three samples of bond paper were selected and tested. Sample A is a rag bond, sample B is a sulphite bond, and sample C is a 50 per cent rag bond. From each sample 20 folding strips were cut in the machine direction. These were divided into two lots. One lot was tested in the cabinet and the other in the large constant humidity room, all tests being made on the same folding tester. The relative humidity in each case was maintained as nearly as possible at 65 per cent. During the tests made in the cabinet the relative humidity of the air in the laboratory was 27 per cent and the moisture content of the paper before going into the auxiliary conditioning chamber was in equilibrium with this air. The temperature of the room was held constant so that the difficulty of temperature variation discussed above would not be involved, and the relative humidity remained at 65 per cent to 66 per cent throughout. The results are given in Table 2.

TABLE 2

DATA SHOWING COMPARISON OF FOLDING RESULTS IN THE CABINET AND IN A CONSTANT HUMIDITY ROOM

	Sample	Folding tests made in Cabinet	Folding tests made in Humidity room
Number of double folds	A	1040	916
	B	317	308
	C	156	161
Mean variation from average, per cent	A	7.3	19.1
	B	11.1	24.6
	C	21.3	16.5
Maximum variation from average, per cent	A	20.5	51.5
	B	29.7	49.0
	C	85.2	36.7
Minimum variation from average, per cent	A	0.9	0.4
	B	2.5	5.9
	C	2.6	0.6

This table gives the number of double folds made by the tester before failure of the specimens and also the per cent variations from the average of the results in each case. Satisfactory agreement is shown in the total number of double folds. The individual results are, on the whole, more uniform in the cabinet as shown by the per cent variations from the average. This is probably due to the greater uniformity of the relative humidity which is possible in the testing cabinet.

These results are very encouraging and indicate the entire feasibility of the small conditioning and testing cabinet in making possible accurate folding tests. With some further developments this small testing unit should make available a means of obtaining reliable results in those paper testing laboratories which do not fell justified in going to the expense of equiping the laboratory with a constant humidity room.

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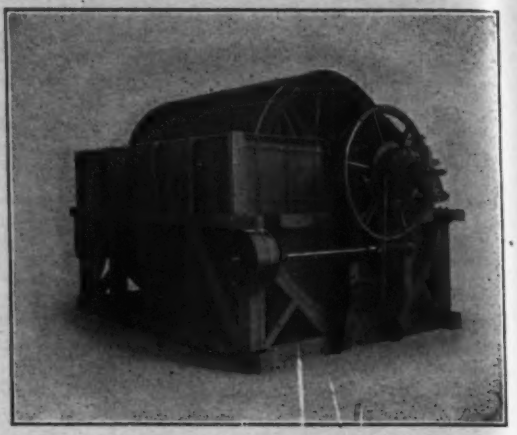

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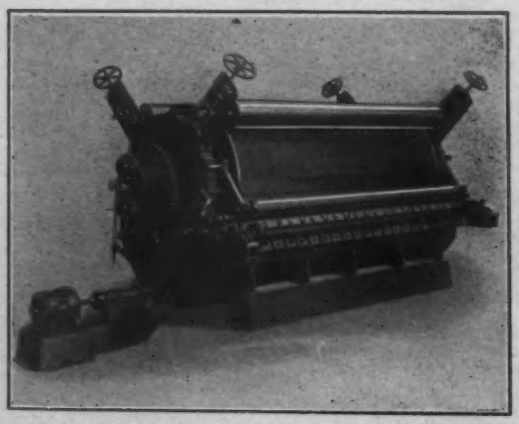

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The Biffar Combined Refiner and Screen

By L. C. Marburg[1]

A discussion of the general question of refining waste is not considered within the scope of this paper. This subject has had the attention of your committee and your individual attention for some time past. If I interpret present tendencies correctly, the opinion is becoming rather general that the custom of wasting screenings can in most instances no longer be justified, and that a thorough investigation of the situation surrounding the operation in each mill is called for in order to find out to what extent the waste occurring in the mill might be refined and for what purposes it might be used.

The questions which must be answered when the investigation is made to determine whether refining of waste will pay or not are the following:

1. How much stock is being wasted at the present time?
2. What is the character of the waste appearing at various stages of the manufacturing process?
3. What method and what equipment are available for refining this waste?
4. What investment will be needed?
5. What will be the cost of refining each individual kind of waste occurring in the mill?

The small contribution which the present paper would like to make to the solution of the general problem relates to the methods of refining, the character of the equipment available and some factors which enter prominently into the question of investment and the cost of refining.

Screening as Well as Refining Needed

At the beginning it may probably be said without fear of contradiction that the refining of most kinds of waste cannot be accomplished satisfactorily by simply passing the waste in question through a refiner, no matter of what particular design. Waste is generally not of a uniform character and therefore should not all receive uniform treatment. Frequently the rejections of the main screenings contain a great deal of good stock which does not require any refining and the practice of repeated screening has therefore been adopted in many plants in order to discard as little of the good stock as possible. No matter, however, whether or not rejections are rescreened before they are considered waste, such waste is not uniform and some of it therefore requires more refining than the rest. This plain fact has led to the adoption of two methods of handling the discharge from the refiner. First: Mixing this discharge with the stock coming from grinders or digesters and giving the parts sufficiently refined an opportunity to pass through the screens together with such parts of the virgin stock as are able to pass, while the rest will go to the refiner a second time, together with the rejections from the fresh stock. Second: The installation of separate screens which will handle only the discharge of the refiner and which will pass particles sufficiently refined while rejecting the rest, which is then automatically returned to the refiner for further treatment.

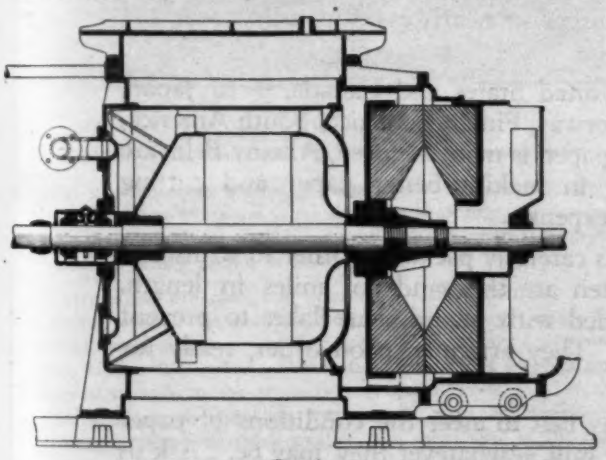


FIG. 1

Longitudinal section through Biffar refiner.

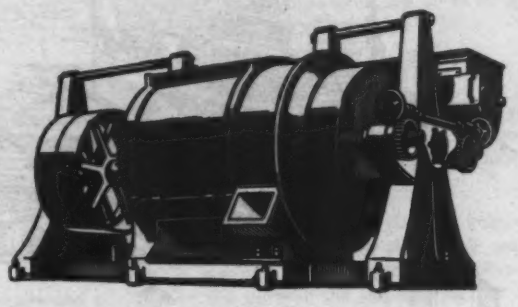


FIG. 2

Outer appearance of Refiner.

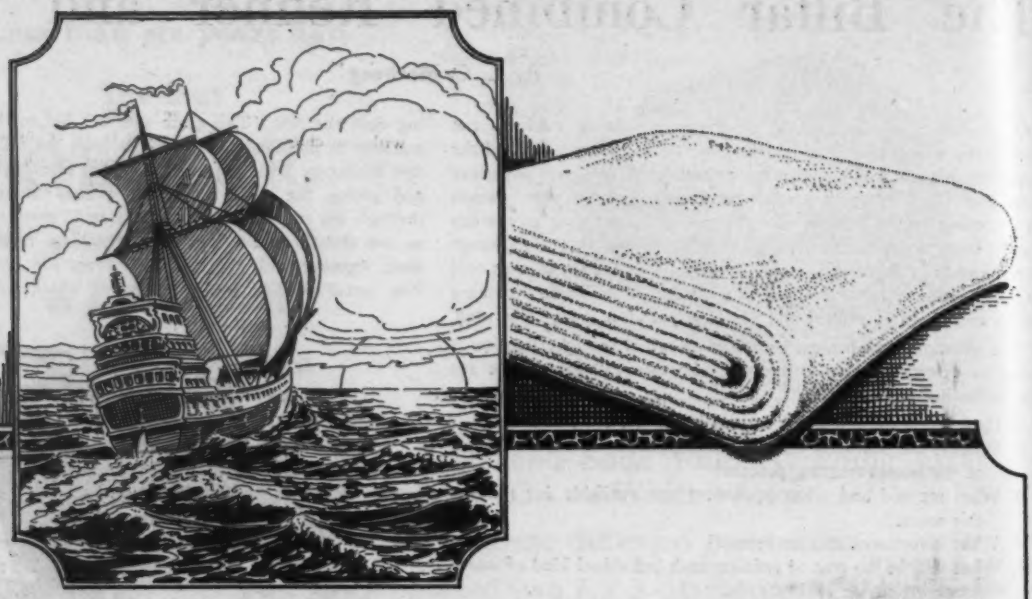
The Biffar Refiner

Believing that equipment and installation should be simplified the inventor of the Biffar refiner combined a disc type refiner and a centrifugal screen in one housing and arranged to have the stock which has been refined, automatically passed to the centrifugal screen and to have the rejections of the centrifugal screens automatically returned to the refiner. The result, of course, is that any stock once sent into the combined unit will not leave it until it is capable of passing a certain perforation chosen in accordance with the character of the waste and the purpose for which the refined waste is to be used.

The design and action of the Biffar refiner which is extensively used in Sweden, Finland, Germany, Czechoslovakia and Austria will be easily understood from the longitudinal section shown in Fig. 1. The refiner consists of two round basalt lava stones, one of which is mounted stationary while the other one, which is located opposite this first stone, is mounted on a shaft so that it can be rotated. On the same shaft with the rotating stone is mounted a drum with paddles arranged longitudinally on the circumference of the drum. Waste stock after passing through the refiner passes into the screen section of the unit. Here it is thrown against the screen which passes the particles sufficiently refined while the rejections are carried to the far end of the centrifugal screen and discharged into a trough mounted on the side of the machine. Through this trough the rejections are returned to the refiner end of the unit, by means of a spiral conveyer, for reentry into the refiner.

Stock may be introduced into the trough so that it reaches the refiner first, or it may be introduced at the lower opening of the housing, in which case it will first be screened for the purpose of removing from it, as far as possible, all good stock before the rest is refined. Which one of the methods should be followed depends mainly on the character of the rejections to be dealt with.

[1] Associate member TAPPI; Sec. Marburg Bros., Inc., New York, N. Y.



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Very coarse rejections mixed with but very little good stock are preferably sent to the refiner first, while rejections containing a good deal of good stock should be screened first. The mixing of the rejections of the refiner screen and of waste introduced into the machine, therefore takes place either in the trough attached to the machine or at the screen entry adjacent to the refiner. No pump is required for circulation.

The Stones

The lava stones are dressed so that each stone will have a set of spiral grooves, the two sets of grooves intersecting when the stones are mounted in the refiner. The distance between the two stones is adjusted by moving the stationary stone, which is under the control of a hand wheel and worm gear, located outside the housing at its refiner end. This arrangement is clearly visible in Fig. 2. The stationary stone is not held solidly in its position, but has a certain play under the influence of a set of springs which allow the stone to recede in case some large parts enter the space between the two stones. Very interesting is the statement of Mr. Biffar that the stones are not in contact when in operation. Their action on the stock seems to me mainly a squeezing action separating the fibers from each other, although, of course, a certain amount of cutting cannot be avoided.

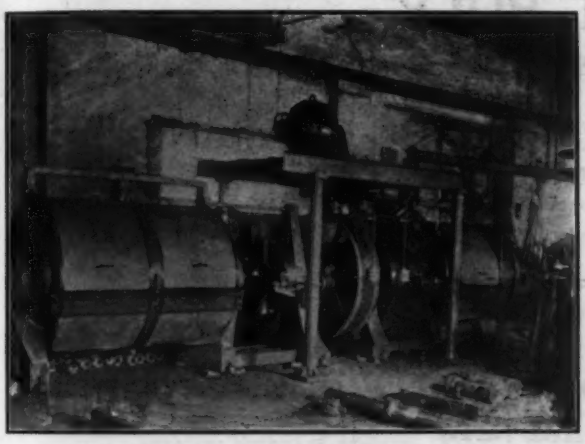

FIG. 3

Combined unit of Main Screen and Biffar driven by common motor.

Perforations are chosen in accordance with conditions. With chemical pulp the perforations used abroad vary from about 0.07 to 0.14 inches in diameter, while in refining groundwood they vary from 0.035 to 0.05 inches. These latter perforations are finer than those customary in the production of groundwood pulp in this country. Generally speaking, there would seem no reason for selecting perforations much smaller than those used in the main screens, while, on the other hand, they may be chosen larger in special cases when it is desired to use the refined rejections for purposes less exacting than those for which the main stock is used.

The consistency of the stock entering the centrifugal screen increases from one end of the screen to the other and suitable provision is made to wash out the stock at the tail end of the screen, before it leaves. For this purpose a circular ring with perforations is cast in one piece with the end housing and water is sprayed into the space between the drum and the screen. This arrangement is clearly shown in the longitudinal section, Fig. 1.

The consistencies most commonly used abroad are in the neighborhood of 5 or 6 per cent in the refiner, and about 0.5 per cent in the screen. This means that water has to be introduced into the stock after it leaves the refiner and before it enters the screen, but if the stock to be refined is introduced into the screen first it may carry enough water to give a satisfactory consistency for the combined stock, including the discharge from the refiner.

Capacity and Power

Capacity and horse power requirements vary, of course, largely with the character of the stock to be refined and the perforations selected. It is evident that this must be so, since whatever stock is not refined sufficiently the first time, must be passed through the refiner a second or third time before it will pass the perforations, so that the work to be done, per ton of stock, increases with the coarseness of the stock and the fineness of the perforations. The types most used are rated from about 6,500 to 11,000 pounds of airdry material per twenty-four hours. Roundly speaking, the power requirements of these machines are from 20 to 50 hp. The speed of the units varies from 220 to 300 r.p.m.

Maintenance

According to the experiences abroad, redressing of stone is necessary from three to six times a year, depending on conditions, and the life of the stones may be assumed as one and a half to two and a half years.

The stones are held in shells into which they are cemented, as may be seen in Fig. 1. Together with their shells they can, within a very short time be removed and replaced by another set of stones and shells. For this purpose the end housing and the bed of the machine are designed so that loosening a few bolts will allow the end housing to be shifted on the bed without difficulty and thus give access to the stones. An I-beam with trolley and chain fall is furnished with the machine and mounted on it, above the refiner end. By means of this equipment the stores are taken out and the new ones put in their places.

Redressing of stones is done by means of a pick and is said to require no particular skill whatever. Where it is desired to maintain continuous operation without a day's shutdown of the refiner, a spare set of shells with stones is kept in dressed condition ready for exchange when necessary. When stones have become too thin from wear and redressing, new stones are cemented into the shells.

The question whether refined stock should be mixed with the stock passed by the main screens cannot be answered generally since this depends on the character of the waste, the pulp produced by the mill, and the use which refined waste alone might find. Frequently it may prove advantageous to use the refined waste separately for the manufacture of wrapping paper. Furthermore, the question whether all waste should be refined or whether some of it appears not worth refining, should be discarded, is also one which the individual mill must answer. In groundwood mills it might perhaps appear desirable to discard the rejections from the knotters, while in chemical pulp mills all rejections could generally be used to advantage.

An interesting type of equipment, used in a few instances abroad and combining a large centrifugal screen with one of the units here described, is shown in Fig. 3. The main centrifugal screen and the Biffar refiner unit are mounted on the same shaft and jointly driven by a motor. The rejections from the main screen pass into the refiner and are restlessly refined before being discharged by the refiner. The arrangement is generally such that the discharged stock of the refiner can either be mixed with the discharge of the main screen or used separately, as may be desired from time to time in accordance with conditions and requirements.

It seems to the author that the equipment here described simplifies materially the installation needed for refining waste and that it accomplishes such refining with a minimum of investment, a minimum of power and with low maintenance charges.

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Lime Sludge Analysis

By R. H. Stevens and A. J. Abrams

The importance of a rapid accurate method for the analysis of lime sludge produced in causticizing sulphate green liquor has hardly been appreciated. When we consider, however, that for a consumption of 600 lb. of lime per ton of pulp each per cent of Na_2O left in the sludge means a loss of 14.5 lb. of saltcake per ton of pulp and each per cent of free lime represents a loss of 11 lb. of lime per ton it becomes apparent that an accurate method of analysis is essential for efficient management.

The methods of analysis already in use vary from a simple washing on a filter paper with titration of the filtrate, to very elaborate operations which consume time disproportionate to their value. In proposing the tentative method of analysis submitted herewith it has been our aim to simplify the operations as far as possible without sacrificing accuracy. It is expected that some of the details may require modification in the light of future experience, as always with tentative methods. This procedure has been used in our laboratory twice daily for a period long enough to establish its value. Comparison with other methods have shown it to be accurate within the allowable limits for routine control work and the actual time required for manipulation does not exceed forty minutes.

The methods of sampling deserve special consideration. The ideal method for slurries is by some means of an automatic mechanical sample such as are used in mining operations, e.g. the Dorr sampler. Where such is lacking and manual sampling must be resorted to it is important that this be done at regular intervals and by an individual who is conscientious, reliable and who has no possible reason for bias.

The manipulative methods do not require elaboration though if any question should arise in the mind of anyone we shall be only too glad to explain in detail our reasons for selecting this procedure. Criticisms will be appreciated.

Tentative Method of Analysis

APPARATUS.

One 100 cc. graduated cylinder.
One 250 cc. volumetric flask
One 500 cc. volumetric flask
One 25 cc. pipette
One 50 cc. pipette
One 25 cc. or 50 cc. burette reading to 0.1 cc.
One 250 cc. beaker } —equipped with watch glasses and glass
Two 400 cc. beakers } stirring rods of convenient length.
One Buchner funnel (65 mm) with filtering flask and attachments
One bunsen funnel for filtration
One platinum crucible
One 50 cc. flat bottom flask
One mechanical stirrer with arms at least 50 mm. length equipped to run at 800 or 900 r.p.m.
One 1 pint tin can. (80x110 mm. is convenient size.)
Analytical balance, bunsen burner or electric furnace for ignition of precipitates, filter papers, wash bottle and N/10 HCl and Methyl orange indicator.

Specimen

The sample shall be taken from the slurry formed by washing down the cake from the filter, or by diluting the settled sludge with water for washing out to the sewer where filters are not used. Or the sample may be taken from the filter cake where the latter is discharged without thinning. In the latter case the sample shall be diluted with distilled water to not more than 10 per cent solids. The sampling shall preferably be done by an automatic mechanical device, or else manually at regular intervals (e. g. every hour) by a disinterested individual.

Method

1. TREATMENT OF SAMPLE.
A 100 cc. portion of the well mixed slurry (or 10 g. sample of the filter cake diluted to 100 cc. with distilled water) is filtered on a buchner funnel and the filtrate transferred to a 250 cc. volumetric flask. The sludge cake remaining on the filter is washed into a graduated cylinder and diluted to 100 cc. with distilled water.

This is then stirred for five minutes by means of the mechanical stirrer, the mixture filtered as before and the filtrate added to the first. The combined filtrates and washings are then made up to 250 cc. The sludge is dried in the oven 100° C (+ or − 5°).

2. SOLID CONTENT.
A 25 cc. portion of the original slurry is evaporated to dryness in a weighed flat bottom 50 cc. flask and the solids determined. Let "A" be four times the weight of solids obtained. This represents the total solids in the sample treated in (1).

3. FREE LIME.
a. A 50 cc. portion of the solution prepared in (1) above is heated to boiling in a 250 cc. beaker and the iron and alumina precipitated with ammonium hydrochloride and ammonium chloride in the customary manner. This precipitate is filtered off, the calcium precipitated from the filtrate by means of ammonium oxalate, the precipitate filtered, ignited and weighed as CaO in the usual manner. Let "B" be five times the weight of CaO obtained.

b. For specially accurate results a 1.0 g. sample of the dried sludge should be mixed with 450 ml. of distilled water, stirred for ten minutes with the mechanical stirrer and filtered. The filtrate is made up to 500 cc. with distilled water and 100 cc. portion titrated with N/10 HCl to methyl orange end point. Let "C" be the number of cc. acid used multiplied by 5 × 0.0028 (or 0.0140.)

$$\text{The per cent total free lime} = \frac{B + C}{A} \times 100.$$

Note: For routine control work the refinement outlined in (b) may be omitted.

4. TOTAL Na_2O.
a. A 50 cc. portion of the 250 cc. solution prepared in (1) is titrated with N/10 HCl to methyl orange end point. Let "D" be five times the number of ml. acid used.

b. The sulphate is determined in the solution used in (a) by precipitation with barium chloride in the usual manner. The weight of barium sulphate obtained multiplied by 5 × 0.266 (or 1.33) is the Na_2O equivalent to the sulphate found. Let this quantity be "E". Then the total per cent of NaO in the sludge is

$$\text{Per cent } Na_2O = \frac{D - \frac{B}{0.0028} \times 0.0031 + E}{A} \times 100$$

5. CALCIUM SULFATE.
If it is desired to know the amount of $CaSO_4$ contained in the sludge this can be determined by boiling 1.0 g. of the dried cake obtained in (1) with dilute HCl, filtering off any carbonaceous or other insoluble material and precipitating the sulphate with barium chloride as in 4(b) above. Let "F" be the weight of the barium sulfate obtained.

$$\text{The per cent } CaSO_4 = \frac{0.583\ F}{A} \times 100$$

TECHNICAL SECTION, PAGE 121

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Report on Refiners

By C. K. Andrews *

The Mechanical Pulp Committee continued its investigation on various types of refiners for refining groundwood tailings the past year. Information secured from news print mills throughout the United States and Canada did not indicate that very much progress was being made during the past year in the refining of groundwood tailings.

At our mill, Itasca Paper Company, we installed a 59 inch Voith refiner, equipped with lava stones. The refiner installed was borrowed from one of our neighboring mills. It was probably too large for a mill of our capacity, which is approximately 55 air dry tons of groundwood per 24 hours, and possibly required more power than would be needed by a refiner of the proper size. Unfortunately, due to a defective casting on which one of the stones was mounted, it was wrecked before our experimenting was completed. This refiner was driven by a 100 horsepower motor, and a careful record was kept of the power consumed.

Power Required

In running the rejections direct from the centrifugal screens, to the refiner, we found the power required to operate the refiner was 40 horsepower immediately after the stones were sharpened, and it gradually worked up to 100 horsepower, averaging 70 horsepower. By running the rejections from the primary centrifugal screens over a wet machine, we found that about 2.5 to 3.0 air dry tons per day would go to the refiner, of which only about 0.7 to 0.9 of an air dry ton was actual slivers, that would be rejected by a 12 cut plate flat screen. It was necessary to sharpen the stones every 30 days.

Our screen layout is as follows: Bull screen, 3/8 inch perforations, 1 knotter screen, 0.25 inch perforations, 4 IMPCO screens, 0.075 inch perforations, and 1 IMPCO tailing screen, 0.075 inch perforations, 2 ten plate flat screens, 12 cut plates. The rejections from our bull screen average 0.45 per cent, and the rejections from knotter, 0.14 per cent, (approximately 50 per cent of the stock passing through the knotter.) Rejections from centrifugal screens, 4.6 per cent, (stock coming from the screens at 0.4 per cent), rejections from final flat tailing screens, 1.25 per cent.

A revolving thickener was installed ahead of the refiner to take out some of the water. The consistency of the stock going to the refiner was between 3 and 4 per cent. The stock, after passing through the refiner, was discharged into the unscreened stock from the grinders, and went back to the screens, making a closed system. The introduction of coarse shives into the stock was noticeable, but was not particularly bad. The large slivers rejected by the knotter were not included, but as our one knotter will not handle all of the stock from the grinders, there were some slivers in the stock refined, which would have been rejected by a knotter.

In order to find out how much of the slivers the refiner was reclaiming, a pump was installed which pumped the stock from the refiner over the flat screens, equipped with 12 cut plates, and as a check the rejections from the centrifugal screens were run direct to the flat screens, without passing through the refiner. We found that the operation of the refiner reduced the percentage of tailings taken off the flat screens, 50 per cent.

When operating the refiner, our observations indicated that more fine pulp or wood flour, was introduced into the stock.

A large Wisconsin news print mill has installed a 36 inch refiner the past year, and reports that their trials have convinced them that good stock is further reduced in size by their refiner. They report that they keep routine records of the volume and density of their groundwood white water excess. They were normally using the product from the refiner as a filler on a cylinder board machine. When as a trial, the refiner product was returned to the primary screens, a large increase was noticed in the solids contained in the white water. For this reason, they report they are installing flat screens ahead of the refiner, and will only refine the flat screen rejections.

It was our intention to run the tailings from the centrifugal screens over the flat screens, and put the tailings from the flat screens through the refiner, but the refiner was wrecked beyond repair before this was done.

We are of the opinion that tailings from the centrifugal screens should be thoroughly screened before going to the refiner, as the refiner shortens the good fibres that are introduced with the tailings, and the pulp is of an inferior quality. There is some difference of opinion on this point. Some users of refiners claim that the refiner does not grind up the No. 1 stock going to it with the slivers. This is a very vital point in connection with the operation of refiners, and one which the writer considers too important to be passed on without extensive and carefully worked out tests.

Basis of Power Consumption

From reports we have had from a few mills using refiners of this type, we are of the opinion that they are basing the power consumption on the total tailings from the centrifugal screens. We believe the power consumption should be based on the percentage of tailings, which could not be used without refining. Basing the power consumption this way at our mill, we found it required about 1300 to 1500 kw.-hr., or 72 to 83 horsepower days per ton of pulp, and at our power cost, considered it more profitable to screen our tailings thoroughly than to operate a refiner, taking into consideration the upkeep and inferior quality of pulp secured. It has been our opinion that the excessive size of our refiner stones, together with the fact that the refiner was handling stock, representing a large per cent of the total, which did not require refining was largely responsible for this high power consumption.

The writer had an interview with L. C. Marburg, New York, and A. Biffar, Miltenberg, Germany, designer of the Biffar combination screen and refiner and was told that they had a machine with capacity of 11,000 pounds of tailings per day, which operated at 40 horsepower. The screen is equipped with 0.065 inch perforated plates. The refiner is 39 inches in diameter, equipped with a lava stone. Their claim is that by running the tailings from the primary screens into their screen, it would take out the good stock, pass the rejections through the refiner, and refined stock would go back through the screen. The stock which have not been sufficiently refined, must again pass through screen, returns to the primary screening system. The slivers which have not ben sufficiently refined, must again pass through the refiner. This is accomplished without pumps. Assuming that the 11,000 pounds of rejections fed to this screen contained not more than 3 tons of stock, which it was necessary to pass through the refiner, this combination screen and refiner would operate at 40 horsepower or 720 kw.-hr. per day.

Mr. Marburg is considering installing one of these combination screens and refiners, on trial, either at our mill, or at one of our neighboring mills in Minnesota. If this installation is made, the writer will get complete data on its operation, and will be glad to furnish it to any members who are interested.

* Member TAPPI; Mill Manager, Itasca Paper Co., Grand Rapids, Minn.

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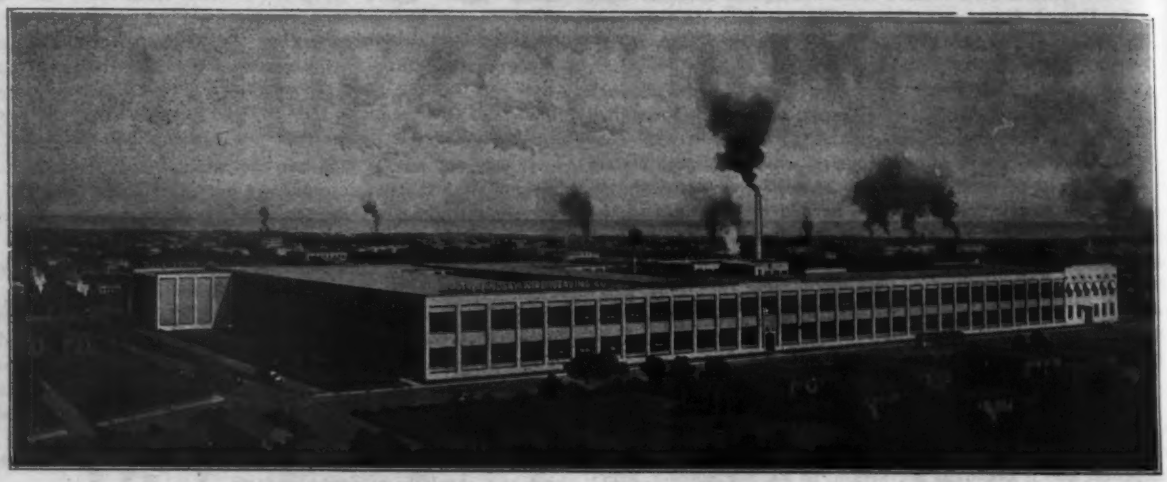
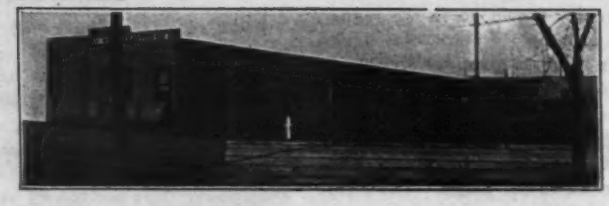


The picture above shows our present plant.



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Consideration of Glue-bound Coated Paper

By George K. Hamill *

Since the initiation of the research fellowship of the National Association of Glue Manufacturers at the Paper Section, U. S. Bureau of Standards, one of the major investigations has been that relating to the use of glue in coated paper. This work was undertaken at a time when market conditions tended to extend the use of glue as a substitute for casein in the manufacture of coated paper and had as its object the gathering of data and information which would aid paper converters in making such a change.

The reduction in the price of casein which took place shortly after the start of this work, eliminated the passing necessity that was its cause, but the investigation has been continued because of the interest shown among coated paper manufacturers due to the periodic and wide fluctuations in the price of casein, the irregularity in the quality of this material, and the possibility that its value in food products and in other industrial processes might make its cost prohibitive for paper coating.

Of late there appears to be an increasing demand for casein as a base material for molded plastics which is being reflected in slow but firm advances in the quoted prices of casein. With such a trend, the natural corrolary is the opening up of new sources of supply where production was unprofitable at lower prices. Unfortunately, much of the casein from such sources is of doubtful quality and the consumer finds himself faced with the alternative of purchasing a poorer quality of casein at an advanced price or turning to the use of another adhesive.

Recent information indicates that the same situation obtains in Europe, where following the removal of war time restrictions on foodstuffs, many paper-coating manufacturers have either failed to return to the use of casein or having done so, have been forced by the competition for this material to turn again to the use of glue.

The investigation of the Bureau of Standards has included consideration of the following features: price, importance of water resistance, preparation of coating mixtures, coating technique, printing qualities of glue-bound coated paper, and specifications for coaters' glue.

Preliminary Report

The results of the early part of this investigation were published in "The Use of Glue for Coated Paper," by V. H. Gottschalk in the PAPER TRADE JOURNAL, November 13, 1924, a summary of which is given:

(1) The amount of glue required in paper coating mixtures varies with the grade of the glue, and in the case of high grade glues, may be less than the amount of casein in the present coating formulas.

(2) The coating technique with glue differs from that with casein only in the necessity of regulating the temperature of mixtures containing glue.

(3) The water-resistance of glue-bound coated paper can be improved, if desired, by the use of small amounts of chrome alum. The need for an extraordinary degree of waterproofness and of water resistance in any but high grade lithograph paper is questioned.

(4) The printing quality of glue-bound coated paper, as far as can be judged from a small number of preliminary tests, is satisfactory with the present inks.

(5) Uniform results in the coating of paper may be attained by the use of glue bought on specifications.

Earlier studies with glue-clay coating mixtures have been expanded to include satin white and blanc fixe: A standard procedure for preparing coating mixtures has been adopted. A large number of semi-commercial runs have been made with different combinations of materials and severe modifications of coating technique. A demonstration of the results obtained has been given for representatives of the National Association of Glue Manufacturers and of the paper industry. Printing tests of papers coated on the semi-commercial equipment at the Bureau, and in commercial plants have been made. Considerable attention has been paid to the printing problems of coated paper.

Considerations of Price

The application of the system of glue grading made possible by the use of the jell-strength tester and the viscosity pipette of the National Association of Glue Manufacturers was outlined in the paper by Gottschalk. It was shown that the cost of the glue used in coating mixtures was rather independent of the grade, and that a medium grade glue could be substituted in place of casein on a pound for pound basis.

Further work has indicated that in determining the final cost chargeable to the adhesive item in the manufacture of coated paper, other factors may exert a larger influence than the spread between the market quotations for different adhesives. The type of stock coated, the weight of coating applied, the grade of glue or the quality of casein, the method of preparing the casein and the cost of alkalies used as solvents, the relative clay suspending power and spreading or covering power of the particular casein and glue compared, the choice of mineral matter and the fineness of particle size,—all these are of large importance in fixing the cost of the adhesive in the finished products.

It has been observed in cooperative commercial work that the amount of steam required for dissolving glue is less than that used for casein at this point.

At the present time there appears to be little difference between the adhesive cost of glue-bound and casein-bound coated paper under parallel conditions.

It has been estimated that 90 per cent of the coated paper used in the United States is used in ordinary printing processes for magazines and books, insert illustrations, catalogue and advertising lines. In neither their printing operations nor their uses, do such products require extraordinary dampproofness.

Further experimental work has indicated that the amounts of hardening agents which may be added to glue-containing coating mixtures without deleterious effects on the viscosity and length of life of the mixture, vary with individual glues and are also largely influenced by the other materials used.

Attention is called to current European coating practice, by which papers suitable for lithographing are prepared from glue-bound coating mixtures by the addition of various materials to the mixture or by different after-treatments of the partially dried coated paper.

Preparation of Coating Mixtures

Optimum conditions for the preparation of coating mixtures with the semi-commercial equipment available at the Bureau of Standards were established in the early stages of this investigation and later procedure was standardized as follows:

(a) The minerals were soaked overnight with part of the water of the coating formula in order to deflocculate them as completely as possible.

(b) The glue was soaked overnight with a part of the water of the coating formula, and while soaking was kept at room temperature. Glue absorbs more water and swells more rapidly at low temperatures than at higher ones. Consequently, when glue has been soaked overnight at reasonably low temperature, the material is in such condition that it dissolves with the application of but little heat.

* Member, TAPPI; Research Associate, National Association of Glue Manufacturers, Paper Section, Bureau of Standards, Washington, D. C.

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(c) The soaked and swollen glue was dissolved by indirect heat at temperatures not above 135 degrees F. When solutions of glue are heated, especially for an appreciable length of time, the proteins are decomposed to proteoses. Since the adhesiveness of glue is commonly regarded as being proportional to the protein contents, it is evident that prolonged heating of a glue solution leads to a lowering of the quality or grade of the glue.

(d) The time of agitation of the coating mixture was as short as would permit of thorough mixing and deflocculation of the mineral. In this way the entrapping of air with subsequent formation of bubbles and foam on the coated paper was materially reduced.

(e) The coating mixtures were screened through fine meshed wire screens. In runs where the mixture was divided into two parts and one part screened through a 100 mesh sieve and the other through a 200 mesh, the paper produced from the portion passing through the finer screen was superior in appearance to that coated with the coarser mixture. This indicates that the degree of deflocculation of the mineral has considerable influence on the presence or absence of mottled effects on the calendered paper.

Coating Technique

Due to the limitations of the coating equipment available, which did not permit maintaining the coating mixtures at uniform temperatures above those existing in the room and which did not permit the refinements of operating control to obtain the thin uniform coatings available with commercial machines, coating formulas were developed for use at room temperature. Depending on the grade of glue and the kind of mineral, the proportion of water in the coating mixture was increased up to 50 per cent above that used in ordinary commercial practices with casein. Where comparative runs were made using a mixture of clay and satin white for the mineral constituents and casein and a medium grade glue respectively for adhesives, the degree of dilution required to obtain satisfactory coatings was the same, about 250 parts of water to 100 parts of mineral.

In other respects the coating procedure did not vary from ordinary commercial practice.

The range of temperatures through which a coating mixture containing glue maintains the optimum viscosity for its application varies with the grade of the glue for any fixed proportion of glue. It also varies with the proportion of glue as influenced by the mineral, the stock coated, the coating conditions and the product requirements. For instance, in a commercial test, run at a room temperature of 77 degrees F., a coating mixture containing 15 parts of high grade hide glue to 100 parts of clay-satin white mixture and 160 parts of water was applied without difficulty, while a similar mixture with 16 parts of the same glue tended to thicken, especially on standing.

The life of a glue-coating mixture is affected by the same factors as influence its viscosity and in addition is shortened by exposure to high temperatures.

Recent studies of a coating mixture made with clay and a medium grade glue at the common commercial dilution of 160 parts of water to 100 of clay, indicate that the viscosity decreases rapidly when the temperature is increased from 75 to 85 degrees F., and only slightly at higher temperatures. This minimum temperature for optimum viscosity of course varies for different glues as just explained.

It may be noted that coating mixtures containing glue, to which hardening agents have been added appear to respond markedly to agitation by decreased viscosities. Such coating mixtures which had been permitted to stand at room temperature until they were too thick to apply were restored to usefulness by comparatively little stirring.

To assist in the commercial application of these studies at the Bureau, a demonstration of the use of glue in coated paper was given at the Government Printing Office, to representatives of the glue industry and of the coated paper industry.

Four coating runs were made, using formulas developed during the investigation. There were employed as adhesives, three commercial glues of widely different grades and for comparison a high grade casein. The stock coated in these runs was a sulphite paper made on the semi-commercial fourdrinier machine at the Bureau. It contained about 10 per cent of clay filler, and was rather slack sized.

At frequent round-table conferences, many factors relating to the use of glue in the coating industry were discussed. The employment of glue in the manufacture of special papers, such as machine glazed, where a higher finish was said to be obtained with glue-bound than with casein-bound papers, and in metal coated papers, the wider range of colors available for use with neutral glue as compared with alkaline casein, the avoidance of troublesome side-reactions by using glue with satin white, were mentioned as present day uses of glue in the industry. It was noted that a considerable number of manufacturers were using glue in conjunction with casein in their processes. The possibility was suggested of applying high grade hide glues, which may be used in relatively small proportions, to obtain a higher degree of elasticity for papers subjected to embossing and similar processes as well as for folding enamels of the type used in advertising broadcasts.

On the third day, samples of the papers coated at the Bureau were subjected to printing tests at the half-tone press room of the Government Printing Office.

Printing Qualities of Glue Bound Coated Papers

As noted in the preliminary report, opinions as to the printing qualities of glue-bound coated papers were conflicting. Due to the many difficulties met in the changes in printing inks and practice which had been found necessary when casein-bound papers were introduced, a strong prejudice was manifested against any attempt to re-employ glue in the coating medium lest similar troubles should be again encountered. However, it has been shown that no adjustment of the thicker, more viscous inks required for use with casein-bound papers is required for use with those that are glue-bound.

In the printing tests of papers coated at the demonstration, no adjustment of the ink was required. Nor was any change made in the press save to set the feed for the sample sheets which were smaller than the casein-bound commercial paper being used at the time. Inspection of the samples showed no evidence of picking, lifting, or dusting of the coating. Variations in the qualities of the reproductions were consistent with the different types of coating employed and the weights of the coats.

During the course of this work other printing tests have been made at several commercial plants as well as at the Government Printing Office. Considerable general information as to the difficulties met with in the printing of coated papers has been accumulated in the course of these tests and in discussions of their results with printing experts.

The wide variations in production factors and in printing procedures make it very difficult to generalize on the subject of printing coated papers. It has been found that variations in the kind of stock coated, the materials entering into, and the methods of preparing coating mixtures, the weight of coat applied, the equipment and the working conditions of the coating, drying, and finishing operations exert a very marked influence on the appearance of the paper produced, as well as on the amount and proportion of adhesive required to obtain a coated paper of satisfactory printing qualities. Similarly, variations in inks and in printing practice influence the quality of the reproduction and the tendency of coated papers to pick or lift during the printing operation.

The difference of opinion which exists between printing houses regarding specifications for coated printing paper may be illustrated by the preferences of two large pressrooms, both of which have excellent reputations for turning out fine work. One requires

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an extremely high finish and uses the same paper, which is rather hard sized, for both black and color work. The other prefers a medium finish and uses rather soft sheets for black work and harder sized ones for color work.

The choice of the less harshly sized coated papers is common for fine work in black. Many of the printers claim that glue-bound papers are especially fitted for this kind of work.

More Cooperation Needed

Some idea of the extreme variations in coating and printing processes, which indicate the need of better coordination of effort between the paper coater, the ink maker, and the printer, may be gained by consideration of the following data of the behavior of a typical high grade glue observed in this investigation.

CASE A—Glue 8 per cent, coating stock No. 1, clay No. 1, applied on experimental coating machine; pick test satisfactory. printing test required reduced press speed and slight softening of ink, at G. P. O.

CASE B—Glue 9 per cent, coating stock No. 2, clay No. 2, applied at commercial plant with commercial equipment, pick test doubtful, printing test poor at G. P. O.

CASE C—Glue 12 per cent, coating stock No. 1, clay-blanc fixe No. 1, applied on experimental coating machine, pick test satisfactory, printing test satisfactory at G. P. O.

CASE D—Glue 12 per cent, coating stock No. 2, clay No. 2, applied at commercial plant X, with commercial equipment, pick test satisfactory, printing test satisfactory, at commercial presses M and N. Samples printed at M showed ink through the sheet, samples printed at N did not.

CASE E—Glue 12 per cent, coating stock No. 3, clay-satin white No. 3, applied at commercial plant Y, with commercial equipment, pick test doubtful.

CASE F—Glue 14 per cent, coating stock No. 3, clay-satin white No. 3, applied at commercial plant Y with commercial equipment, pick test satisfactory, printing test at press O satisfactory, printing test at press P doubtful; printing test at press Q, poor.

CASE G—Glue 15 per cent, coating stock No. 3, clay-satin white No. 3, applied at commercial plant Y, with commercial equipment, printing test at press P. satisfactory, printing test at press Q, barely passable.

Similar examples might be cited without end. The lack of classification of their products for special purposes by many manufacturers, the non-agreement of printing firms as to the types of paper best fitted for the various kinds of printing and the efforts of ink manufacturers to supply satisfactory products to meet such situations, all tend to cause more and more complications and to lead always further from anything like standard practice for each particular type of finished reproductive work. Such tendencies to make even ordinary printing problems the objects of special treatments lead naturally to higher prices and therefore lessened consumption of the commodities involved.

Among the most common faults found by printers regarding coated papers are those relating to non-uniformity, both between different sheets of the same lot, such as occur when a doubtful roll is cut up with perfect ones, or when soft spots in the roll of coating stock have caused irregular weights of coat to be applied, and in different portions of the same sheet where mottling, hard or soft areas, or irregularity of thickness of stock and coat, occur. Many printers state that if uniformity could be obtained throughout individual lots of paper they could obtain inks that would give satisfactory reproductions even with the poorer qualities of coated paper. And of course the necessity of softening inks during a run with the consequent variations in brilliance would be avoided. The objection to hard and soft areas is encountered largely among producers of three-color work, as any condition which necessitates changing the yellow ink of the first impression may lead to further difficulties when the red and blue inks follow. Since this type of work requires brilliant white surfaces to reproduce vivid contrasts, even slight variations in color cause printing troubles.

A second complaint, voiced largely by producers of high grade printing, especially where dull finished papers are used for fine screen half-tones is the presence of fluff and dust on the edges of coated sheets. An instance was recently observed where 90 per cent of the "flecks" formed on the surface of a very beautiful illustration in black were eliminated be retrimming the edges of the sheets with the cutters available at the press. Mill cutting equipment should be carefully attended to in order to avoid this evil.

The Bureau of Standards has a great many inquiries relating to printing difficulties with various types of papers. Without knowledge of local ink and printing conditions, it is not always possible to aid in a specific problem, but in almost every instance, the difficulties might be avoided by a better understanding of their mutual problems and the whole hearted cooperation and coordination of effort by the paper manufacturer, the ink manufacturer and the printer.

In order to obtain satisfactory consistent results in coating paper, the glue should be of known and uniform properties.

The grade of material must be determined by considerations of price, product requirements, and local coating conditions. Since the glue industry is organized on a grade basis, when the grade of material has been decided upon, it may readily be duplicated.

Within any grade a choice of glues may be made on the basis of clay-suspending power by observing the rate of time of settling of small amounts of standard coating mixtures prepared from different samples of glue. As glue manufacturers have generally adopted the colorometric method of determining the hydrogen ion concentration in their manufacturing operations, this method of measurement may be specified for limiting acidity.

The odor of glue is largely determined by stock and manufacturing conditions. Glues free of objectionable odors are readily obtainable.

The factors of grease content and foaming tendency are interrelated, i.e. with a given reduction of the grease content is generally accompanied by an increased tendency to foam. Glues in which these characteristics are at their optimum balance are offered in most of the commercial grades.

While the color of various samples of dried glues varies considerably, except in abnormal cases, the difference in finished papers coated under parallel conditions but respectively containing such samples is seldom visible to the eye. Where desired especially light colored glues may generally be obtained.

Summary and Conclusions

The investigation of the use of glue in coated paper has been extended to include the study of satin white and blanc fixe as minerals as well as clay. The use of glues of widely different grades has been continued. The influence of such factors as variations in coating stock, mineral matter, and coating procedures on the quality of the product has been observed. Printing test of papers coated under studied conditions have been obtained. The effects of variations in inks and in printing operations on the suitability of coated papers for reproductive processes have been noted.

In addition to the conclusions quoted from the preliminary report, it is indicated:

1. That the use of glue introduces no new difficulties in the preparation and application of coating mixtures containing satin white and blanc fixe.

2. That variations in the other materials employed and in coating procedure influence largely the proportion of adhesive required to produce coated papers of satisfactory printing qualities.

3. That printing conditions encountered by coated papers vary widely.

4. That closer cooperation and coordination of effort of paper-coaters, ink manufacturers, and printers is highly desirable.

TECHNICAL SECTION, PAGE 125

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Report of Paper Testing Committee

By B. W. Scribner,* Chairman

At a meeting of members of the association especially interested in paper testing, held at the Bureau of Standards, July 27, 1925, a program looking to the standardization of paper testing methods, and adoption of official methods by the Association was formulated. This program, together with the mechanism proposed for adoption of official methods by the Association was approved by the Executive Committee of the Association.

Purpose of the Present Work

Through the efforts of previous paper testing committees there have been developed methods of testing covering nearly all phases of paper testing. These developed methods have been given publicity for a number of years in a publication of the Association. The work planned, therefore, is first to select from the methods already formulated those best adapted to the various purposes, then to formulate for each given purpose, one method giving in specific terms the apparatus to use, the preparation of the test specimen, the exact procedure to follow, and to use, the preparation of the test specimen, the exact procedure to follow, and the manner of reporting results in respect to units of measurement, limits of accuracy and nomenclature. Our present work, therefore, is concerned mainly with exact specification of the commonly used methods. This may seem comparatively simple, but when it comes to making a description of a test method specific and exact in all its features, it is amazing what difficulties are met with, even in the cases of the simplest and best known methods.

There is such a large volume of clerical and correspondence work involved in a program of this nature, that an organization was effected whereby each division of the work was placed in the hands of a sub-committee. The personnel of each sub-committee was chosen after canvassing all members willing to engage in paper-testing as to their preferences in respect to kind of testing. The preliminary work of formulating the methods is handled by the sub-committee, after which they are considered by the main committee and either submitted for the vote of the Association as regards adoption or referred back to the sub-committee for further consideration.

You can appreciate that an immense volume of work is required for such procedure. Considering this and the time that was taken for organization, it is felt that satisfactory progress has been made. The cooperation of the various members has been excellent, keen interest being manifested, and the necessary spirit of "give and take" being much in evidence. Following is the present status of the work.

Microscopical Testing

All methods considered suitable for adoption at the present time have been formulated. This includes specification of the apparatus to use, manner of preparing the specimen for observation, the procedure for observation by both the count and the estimation methods, and methods of preparing and using the various stains. The Herzberg stain is specified for distinguishing between fibers from different sources. Of the stains for special purposes, the Bright for distinguishing between bleached and unbleached fibers and the Lofton-Merritt for distinguishing between unbleached sulphite and kraft fibers, are the only ones recommended for adontion at the present time.

Physical Testing

Methods for atmospheric testing conditions, bursting strength and thickness have been formulated. Atmospheric testing conditions of 65 per cent relative humidity and 70 degrees F. temperature were almost unanimously approved.

Chemical Testing

Methods completed are parafin, amount of casein coating material, rosin, sulphur and starch.

Optical Testing

H. L. Peckham has made further study of the Eastman colorimeter for measuring the color of paper, and will present a paper on the results so far obtained, at the sectional meetings on paper testing.

Tests for Special Uses of Paper

While several tests of this nature are available and are in most cases supported by satisfactory data as to their suitability, they are in use to such limited extent that some further consideration is being given them before submitting them for vote. Such tests are absorption quality of blotting paper, metallic particles in insulating paper, the sealing wax pick test for coated paper, ground glass method for water resistance of waterproofed papers, and turpentine test for greaseproof papers.

The chief difficulty so far has been in finding members who are able to devote the considerable amount of time required for service as chairmen of sub-committees. The mortality has been high in this respect. Only two sub-committees have chairmen at the present time, the others having resigned as they found the work too heavy to carry on with their other duties. Progress is slowed up for this reason, but it is hoped that the vacancies will be filled shortly.

In formulating the methods, in view of the fact that provision is made for reconsideration of a method at any time a request for it is made by any members, the committee takes the position that where a method is backed by good data, even though it has not had wide use, it should be adopted if it seems the best available. That is, attempt is being made to establish some common practice for as many testing requirements as possible, taking the view that even a poor method is better than none at all. If all agree to try given methods, defects in them will soon come to light, and much more rapid progress will be made than if we withhold methods simply because of unfamiliarity with the use of them.

Some Interesting Developments

Some interesting developments in paper testing during the past year are:

In determination of fiber content of paper, W. Dickson, England, proposes a method based on use of polarized light. Several methods were proposed based on chemical reactions.

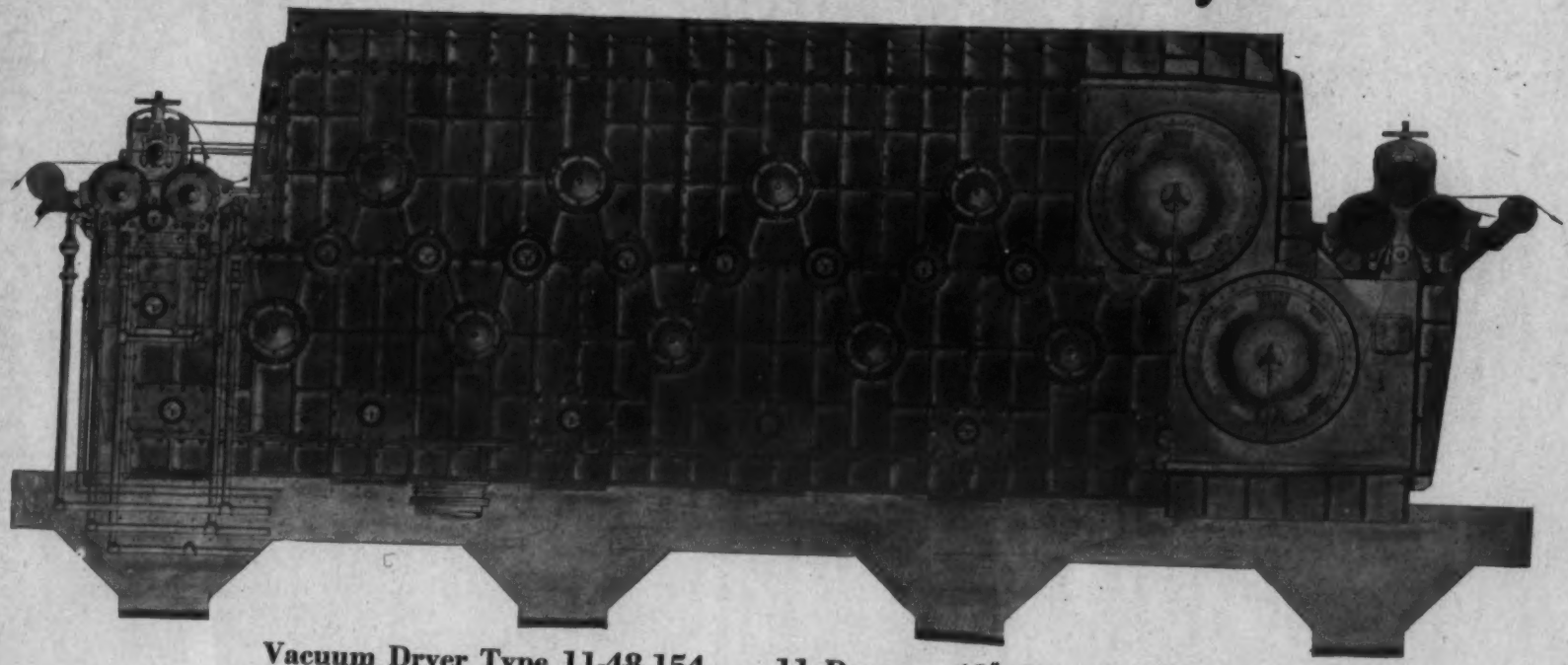
Allen Abrams published the results of a very comprehensive study of the variables entering into the use of the Mullen tester.

S. Kohler and G. Hall published a method for determining acidity of paper. The data given are convincing and it is felt that this is a very important contribution as accurate determination of slight residues of impurities in paper is very difficult, and it is believed that the method outlined points the way to greater accuracy. The grinding of paper for analysis appears to be logical. A machine for this purpose, of American manufacture, is now available.

In reference to optical properties, C. F. Sammet published a description of a modification of the well known Hess-Ives Tint Photometer, for determining opacity. Study of the determination of color, gloss and opacity of paper is continued at the Bureau of Standards as a routine matter, and considerable data are being accumulated. Numerical measurement of these properties of paper is of prime importance both for mill control work and for tests of deliveries by the user. The data so far obtained indicate that

* Member TAPPI; Chief of Paper Section, U. S. Bureau of Standards, Washington, D. C.

Minton Vacuum Paper Machine Dryer



Vacuum Dryer Type 11-48-154. 11 Dryers—48″ diam.—154″ Face

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the instruments now available for such measurements give dependable results.

There is need of a method of determining the flexibility of non-creasing papers, such as bristol boards. The value of the folding test for ordinary creasing papers as a measure of their general resistance to wear is commonly acknowledged but of course such an instrument cannot be used for non-creasing papers. A Schopper instrument for such papers is now available. A. O. Bragg also described apparatus devised for this purpose.

Changes in dimensions of paper due to varying humidity conditions are a very serious problem in the use of many papers such as printing, chart, map, tabulating, etc. An instrument devised for rapid measurement of quality of paper in this respect is now available, but there is not much information on its performance.

F. T. Carson, Bureau of Standards, has developed much additional information regarding permeability of paper to liquids. He has described in publications new methods developed by him such as the curl size tester, and the indicator methods for testing degree of sizing of paper, the ground glass method for detection of permeation of moisture, and a modification for testing grease resistance of paper.

Papers on Paper Testing

At the sectional meeting on paper testing, the following papers will be presented:

"Durability of Paper," by Gösta Hall. A report of an investigation by the Swedish Government concerning factors entering into durability of paper, and methods of determining these factors.

"A Study of the Eastman Colorimeter for Determining the Color of Paper," by H. L. Peckham.

"An Air Conditioned Testing Cabinet," by F. T. Carson. Description of an inexpensive cabinet for conditioning and testing paper at fixed humidity.

It is to be regretted that owing to his present duties not permitting close contact with paper testing, F. A. Curtis felt that he could no longer act as chairman of the Paper Testing Committee. I am sure the Association and the paper industry as a whole appreciate the constructive work in the testing of paper carried on under his leadership.

ALASKA PAPER MILLS GET PYRITES MINE

The historic Sea Level mine, in Alaska, so well known to every resident of the Ketchikan mining district, has passed from the hands of its former owners and the deed as rendered names the Alaska Paper Mills as the new owners.

This once active and promising mine will pass into the limbo of time as a "gold producer," and the iron pyrites or sulphides which the mineral veins contain, will be the chief product to be extracted.

C. R. Berry, chief engineer for the Alaska Paper Mills, states that the sulphides contained in the iron pyrites is one of the best constituents used in the sulphite process of making chemical pulp. Even in ground wood paper mill, Mr. Berry states, it is necessary to introduce a small percentage of sulphite pulp and instead of purchasing this from an outside pulp mill, in the large modern news print mills, it is now manufactured in the one mill.

At the start, about five tons of the sulphides will be required for the local mill; but, owing to the steadily increasing demand by other mills for the chemical product, the mine may be operated to produce it for mills in the states.

The district south and east of Ketchikan is of an unusually high percentage of sulphite ore. Pure sulphur is also employed in the process, most of which is secured from Texas and Louisiana.

Some considerable limestone will be employed in this process, the company being now busy locating some extensive deposits adjacent to its scene of activities on Thorne Arm near Ketchikan.

NORWEGIAN PAPER INDUSTRY IN 1925

Conditions in the Norwegian paper industry during 1925 were fairly satisfactory, says the Paper Division of the Department of Commerce discussing the 1925 situation in that country based on reports received from Commercial Attache Sorenson at Copenhagen. The report continues:

The somewhat slack demand in the beginning of the year was followed by a distinct improvement during the spring and summer months, and production throughout the year was kept at a high level. Exports of news print and wrapping papers, which form the bulk of the Norwegian paper exports, up to the end of November were considerably above those of the preceding year, and all grades, with the exception of fine papers, were in good demand during the closing months of 1925. The total exports during the first 11 months of 1925 aggregated approximately 264,000 metric tons, an increase of 50 per cent over the same period in 1924. Exports during 1925 comprised 145,727 tons of news print, 74,541 tons of wrapping paper, and 43,496 tons of other classes of paper. The Norwegian paper industry at the end of 1925 embraced 41 mills with 92 paper machines, and employing between 5,000 and 6,000 workers. At full capacity the industry at present is capable of producing 350,000 tons of paper of all classes. In addition to the paper mills there were in operation 10 mills manufacturing cardboard with an annual production of 250,000 tons.

Practically all of the chemical pulp mills operated at capacity during the past year, and production reached the high figure of approximately 370,000 tons, an increase of 100,000 tons over the preceding year. Exports for the year are calculated at 264,000 tons compared with 186,000 tons during 1924, an increase of 42 per cent. The heaviest shipments were of unbleached sulphite amounting to 125,000 tons, followed by bleached sulphite, 118,000 tons, and unbleached sulphate, 21,000 tons. A factor in the growth of the 1925 exports has been the demand from the artificial silk industry, particularly the Italian silk industry. As the demand for chemical pulp from the domestic paper mills has been good during 1925 the stocks on hand at the close of the year were reported to be very small, and according to reliable reports fully 50 per cent of the 1926 production has already been contracted for.

From a financial point of view the year has been less satisfactory in these industries. The rapid appreciation in the Norwegian crown was followed by corresponding decreases in the price of pulp and paper as expressed in crowns, and as the cost of labor and raw materials remained at about the same level, mill owners were unable to recoup their losses.

BELGIAN PAPER INDUSTRY ACTIVE

The Belgian paper industry continued very active during December, according to a report from Vice Consul Harrington at Antwerp and production throughout the country was booked ahead for many weeks. Foreign orders were plentiful but the steady domestic demand left little surplus for export. The report says that prices were steady throughout the month.

GOES WITH LINCOLN PAPER MILLS

William Anderson, formerly superintendent of the Howard Smith Paper Mills, Ltd., has accepted a position as superintendent of the Lincoln Paper Mills, Elkhart, Ind. Mr. Anderson arrived in the city Monday, February 15, and immmediately assumed charge of the plant as superintendent.

MARTIN CO. TO INSTALL NEW CYLINDER

The Martin Pulp and Paper Company, manufacturer of ground wood pulp and tissue paper, Norwood, N. Y., has purchased a 94 inch cylinder paper machine from the Bagley and Sewall Company of Watertown, N. Y., for manufacturing lightweight papers.

TECHNICAL SECTION, PAGE 127

RELIABLE—DURABLE—EFFICIENT

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NATIONAL PAPER MERCHANTS MEET

National Paper Trade Association of the U. S. A. Holds Twenty-Third Annual Convention at Waldorf-Astoria Hotel, New York

Albert M. Miller, Vice President of the Central Ohio Paper Co., of Columbus, Ohio, Is Chosen President of the Association for the Ensuing Year—Association Passes Resolutions on the Death of William F. McQuillen, Twice President, and One of the Staunchest Supporters of the Organization—Standing Committees Make Interesting Reports All Indicating Great Interest in the Work.

The meeting of the Wrapping Paper Division of the National Paper Trade Association convened in the Astor Gallery of the Waldorf-Astoria, New York City, at 2:00 P. M., Tuesday afternoon, J. C. Mallalieu presiding.

VICE-PRESIDENT MALLALIEU: I very much appreciate your attendance here this afternoon. I am glad that so many people in the East and from the Far West are interested in wrapping paper.

The first business we have on the program this afternoon is the report of myself as Vice-President.

The annual meeting of the Wrapping Paper Division held last April adopted a definite program based on the recommendation of the Survey Committee, which has as its goal the placing of the distribution of Wrapping Paper on a merchandising basis. As you are all well aware, the Survey Committee was authorized in the fall of 1924 and had undertaken early in the following January the work committed to it, namely, the investigation of safe and sane policies for the merchandising of wrapping papers.

The first step in the promotion of this plan was the issuance of the pamphlet, "Net Profit Control," with which you are all now so thoroughly familiar. This pamphlet has been most enthusiastically received. It sets out in a clear and concise manner ideas which are recognized as fundamental, and it has been a powerful influence in the promotion of the plan. At the April meeting it was suggested that the Vice-President in charge of the Wrapping Paper Division, accompanied by N. A. Schoenbucher and the Secretary or the Assistant Secretary, should visit the different local markets, hold local meetings, develop the ideas set out in "Net Profit Control", and to promote their individual operation. During the past ten months, fifteen cities have been visited and the meetings have all been enthusiastic. I believe we have accomplished some real results. The cities visited and the number of executives and heads of departments we have addressed are as follows:

Boston, 35; Pittsburgh, 18; Cincinnati, 5; Louisville, 25; St. Louis, 30; Kansas City, 20; Des Moines, 17; Minneapolis and St. Paul, 56; Milwaukee, 16; Philadelphia, 28; Baltimore, 35; New York, 26; Richmond, 30; Tampa, 26; total, 367.

ALBERT M. MILLER, PRESIDENT

All of these meetings were addressed by Mr. Schoenbucher and myself and were attended by either Mr. Ridgway or Mr. Higgins.

It will be noted that with rare exceptions these meetings were well attended, but the prize must be awarded to the new Virginia-Carolina Association, which had a 100 per cent attendance at the meeting in Richmond on January 25. In spite of the long distances which the members of the Southern Association were compelled to travel to attend the meeting in Tampa, the attendance approached 100 per cent. I believe that this is conclusive evidence of the interest which has been aroused among Wrapping Paper merchants of the need for sounder methods of distribution. It had been my intention of visiting all of the markets affiliated with the National Association before this meeting, but I have found it impossible to fully realize this intention. I do not feel it is necessary for me to explain why this has not been possible, for I believe you must appropriate the difficulties which confront me in taking time from my business. Had there been a full year between the last annual meeting and this, I feel that I would have come a bit closer to the full performance of the program as undertaken. It is my intention to visit the remaining markets early this spring.

In Boston, Louisville, and St. Louis we addressed meetings of salesmen and executives, and at the three meetings I would estimate a total attendance of approximately 250. The purpose back of these meetings was to acquaint the salesmen with some of the problems which had been developed and, in view of the experience of these meetings, it is my belief that they can be more effective if held at some time after executives and heads of departments have become more thoroughly conversant with the ideas outlined in "Net Profit Control" and after they have gone very fully into their own "cost of doing business." I

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of the

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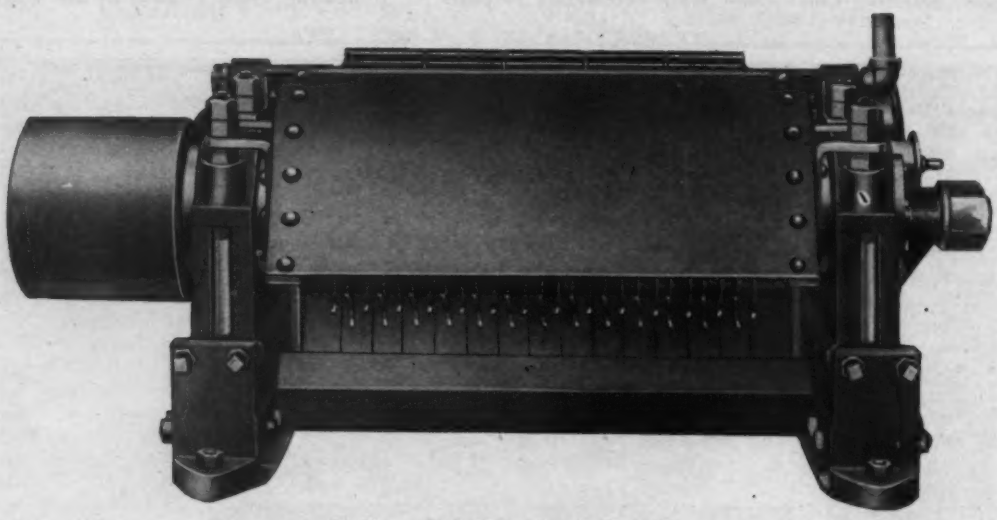

Delivery End of the Arpeko Shredder

The ARPEKO SHREDDER offers exceptional advantages for shredding pulp laps and sheets. It will shred at least four dry tons of kraft sheets per hour, operated by a 50 H. P. motor.

It will shred at least 400 dry tons of kraft sheets without re-sharpening the blades, and has made frequent runs of 800 tons without changing blades. On semi-dry pulps a full month's run may be expected, and the blades can be removed, sharpened and replaced by one man in three hours.

The peculiar clawing action of the ARPEKO SHREDDER preserves the original length of fibre and leaves the shredded pulp with fuzzy edges, and in a condition for quick hydration and further reduction not to be equalled by knife-cut stock.

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likewise believe that before such meetings are undertaken in the future, local meetings should be held at which the facts as to cost are developed, a basis of confidence, one in the other, inspired, and a somewhat definite program worked out.

It is my conviction, however, that progress in placing Wrapping Paper on a merchandising basis will come largely from individual rather than from collective action. The fact that individual merchants here and there throughout the country have successfully placed their business on this basis regardless of action by their competitors is, as I view it, ample proof that it can be done successfully in this manner.

If the individual Wrapping Paper member will investigate the facts regarding his own business along the lines as suggested in "Net Profit Control," he is bound to come to the conclusion that only by the adoption of sound merchandising methods can his business be put on a firm foundation. When he arrives at this conviction, I cannot urge too strongly that he have the courage to make the necessary changes in his methods and that he do so regardless of his competitors. I am sure that the results will be entirely satisfactory.

Important Committee Work

Two of our standing committees have done important and constructive work during the past year. I refer to the Bag Committee of which Mr. M. O. Byrne is chairman, and the Tissue Simplification Committee, of which Mr. A. J. Corning is chairman. Both of these committees and their respective chairmen should be commended for the good work that they have done, but it will be entirely wasted unless the simplification plans in both, lines which have been worked out in conjunction with the Department of Commerce, have the unqualified support of every individual member. Those of you who are handling bags are fully conversant with the deplorable condition which has existed in that line for several years, and the simplification program, if put across, is bound to improve this condition for both manufacturer and merchant. The same is true in regard to the Tissue simplification program, and I cannot too earnestly solicit the co-operation of the membership of this Association.

For some four or five years this Association has semi-annually given dinners to which representative manufacturers have been invited and which have been termed "Conference Dinners." These dinners have been without definite program and have been held for the purpose of establishing a real confidence between producer and distributor of paper and with the idea that ultimately, upon the establishment of such confidence, some constructive, definite action would be the outcome. At the Conference Dinner at the time of the meetings in Chicago in October, several of the manufacturers in attendance suggested that it was time to reduce to writing trade customs for Wrapping papers. This suggestion has resulted in the appointment of Trade Customs Committees both by manufacturers and by this Association, and at the Conference Dinner held Monday evening a set of Wrapping Paper trade customs was approved by these committees. Later in the afternoon, the chairman of your Trade Customs Committee will submit his report. I believe that this is a real, concrete, definite forward step and that it will result in adding stability to the Wrapping Paper business. It is my confident belief that the present meeting will result in the adoption of these trade customs.

Trade Customs Must Be Observed

I cannot, however, bring it too strongly to your attention that the mere adoption of trade customs will accomplish nothing. In order to obtain the good results from any trade customs, they must be observed by both manufacturer and merchant. The members of the National Paper Trade Association should get solidly behind these customs. The measure of their effectiveness will be in exact proportion to the support given them by manufacturer and merchant.

It is my belief that real progress has been made during the past year in placing Wrapping Paper on a merchandising basis, and in conclusion I wish to state that no progress would have been possible had it not been for the unstinted support which has been received from committees, officers of local Associations and the individual members of the National. I take this occasion to thank each and everyone of you for the support you have given. We have only made a start and there is still room for greater progress, but it cannot be expected unless we have the support and co-operation of each and every member.

The next is the report of Assistant Secretary, Mr. C. K. Higgins.

Report of Assistant Treasurer

ASSISTANT SECRETARY HIGGINS: Gentlemen, it is believed by the officers of your Association that when you have shown sufficient interest in Association activities to have undergone the long trip, which in many cases has been necessary to attend the meetings, we should be in position to give you some information which you can utilize directly in your business.

At the beginning of a year, the mind of a business man naturally looks forward and attempts to estimate what the New Year will bring forth in the business cycle. He then gathers as much information as possible and should arrive at a decision in his own mind as to what the trend of markets will be.

It is the purpose in the first part of my talk to you this morning to present for your consideration certain fundamental factors which we believe to be favorable to a continuation of the present volume of business, and other factors which seem less favorable, and in some cases distinctly unfavorable to a continuation of the present high rate of production. tI is hoped that you will weigh these two groups of facts and will then be able to determine in your own mind the proper course to pursue.

At the outset please let me make it plain that I in no way am assuming the role of a prophet, but am simply presenting to you certain facts which I trust will assist you in making a decision in regard to the trend of markets for at least the first six months of this year. I shall take up now the favorable factors.

Cheap Money

Any student of economics quickly notices that cheap money is usually present when business is expanding and the volume of production increasing. When money can be borrowed at low rates, it very naturally follows into industrial enterprises.

Dawes Plan

Ever since the adoption of the Dawes Plan, our foreign trade has been increasing rapidly due to the fact that some European nations now have a basis upon which they are able to pay for American goods.

Farmers' Income

In considering the farm situation, we must realize that farmers constitute from 35 per cent to 40 per cent of the total population, and while we are at present hearing of the unfortunate predicament of certain groups of farmers, I would like to call to your attention that as a whole their income in 1924 was estimated to be $3,000,000 more than in 1921. Educational work on the part of state institutions and government agencies is assisting materially in convincing the farmer of the practicability of rotating crops rather than year after year depending upon the same product.

Manufacturers Not Over-produced

While 1925 has shown a tremendous schedule of production in various commodities, it appears that at present there is no great over-production. In passing, I might say that in the wrapping paper field we still have the bag industry with us, which seems to be tremendously over-produced. Manufactured goods, however, have met with a keen demand, and it is believed that manufacturers' stocks are not at present unusually large.

Building Boom

The economists at the end of 1924 predicted that the height of the building boom, which had been growing by leaps and bounds

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In the Daily News Mill at North Tonawanda; Frank Smith Paper Co., Middletown; Kalamazoo Vegetable Parchment Co., at Kalamazoo; Kimberley Clark at Niagara Falls, N. Y., Appleton, Kimberley and Niagara, Wis.; H. F. Watson Co. at Erie and other mills which have recently modernized their paper making equipment, or established new plants, Connersville Cycloidal Vacuum Pumps have been included to serve suction rolls, flat boxes and dryers. Many of these pumps were ordered because the plant managers had had previous knowledge of the dependable economical operation of Connersville Pumps.

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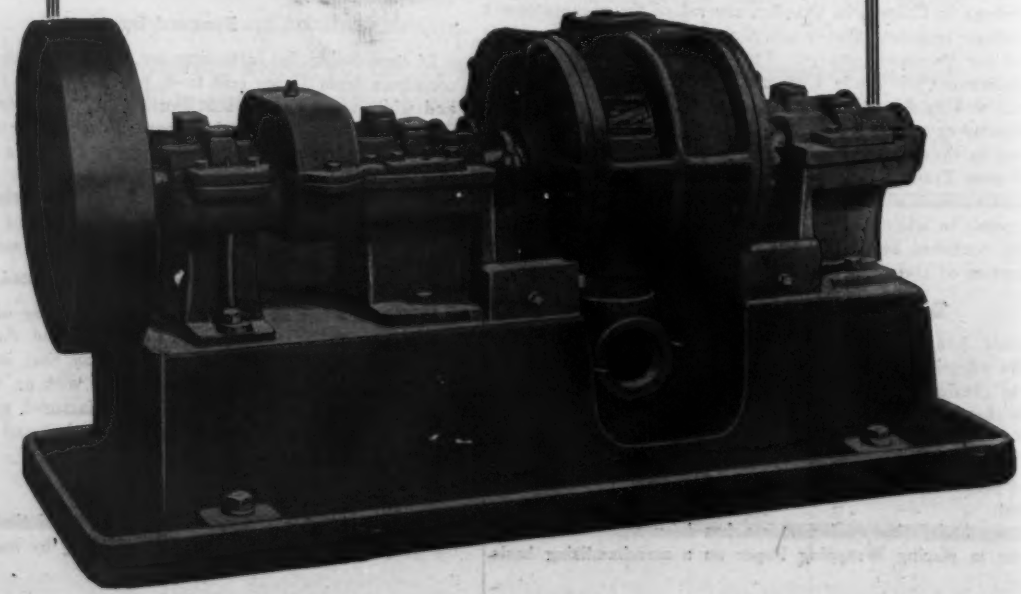

ever since the war, had been reached, and they predicted at that time that 1925 would show a slumping off of this industrial activity, but the economists notwithstanding, 1925 broke all existing records in building.

Now, at the beginning of 1926, it is again felt that the peak of the building boom must have been reached and I personally have heard some of our leading economists say they are unwilling to make a prediction on general business conditions until they see the building program for the spring of 1926.

The great question to be considered is whether this boom can taper off gradually or whether its termination will be abrupt, thereby causing a considerable jar to the business world.

Automobile Sales

Automobile sales in 1925 broke existing records, which proved conclusively that the American public have and are spending money.

Transportation Conditions

Transportation conditions are very favorable and you have, I am sure, noticed the alacrity with which shipments are made from the mills, without delays in transit which have occurred so frequently in the past. The railroads are at a high state of efficiency and excellent transportation conditions are the result.

Plenty of Labor

At the present time there seems to be no dearth of either skilled or unskilled labor and whenever a new enterprise is undertaken, labor is sufficiently plentiful to insure its completion.

High Stock Market

Regardless of the opinion of those who may have bought stocks within the last thirty days, we must admit the stock market is in "high ground," which is usually an indication of prosperity and in many cases is considered to forecast business conditions by about six months.

It is believed that these nine fundamental conditions are those which have brought about the great business year through which we have just passed.

I am sure any one will admit that 1925 has been a great year in volume, which means that, after all, the business was there, and I find that, in the case of most of our houses, it was a year of fair profits.

I would now like to call your attention to the unfavorable facts which appear to be in the picture.

Production Capacity Must Curtail

Whenever production has been speeded to the point it reached in the last months of 1925, there is a danger that it will continue too long, and before it is realized run up a surplus, which means eventually sagging prices and poor business conditions.

If only the manufacturers can see the wisdom of not over-extending their production schedule at this time, even though the demand be keen, it will help materially in continuing the prosperous era.

With such shining examples of the effects of over-production still fresh in their minds, I feel sure the manufacturers each year watch their production schedule with closer attention, so as not to bring about over-production.

International Trade

I would call your attention for a minute to foreign competition, which, it appears, from an examination of export and import figures, is getting daily keener and keener.

Liquidate Debts Through Trade

Foreign nations have apparently decided that the only way in which they can meet their war obligations to this country is by buying our raw products, manufacturing them into the finished article and reselling them again in this country. With this great economic force working day and night it seems reasonable to predict that the next year will bring even greater competitive conditions in regard to our foreign import trade.

Trend of Building

There appear to be certain indications in some of our larger cities that the trend of building will be down. In a number of cities figures already indicate that rents are coming down rather than coming up and, in general, realization on the part of the public that building costs were coming down, would, it appears, bring a sudden halt to building activity.

As before stated, if this slacking off of building activity can only be done gradually, all will be well, but if it should stop abruptly, it is believed the results will be far from favorable.

WILLIAM C. RIDGWAY, SECRETARY

Automobile Industry

While I have mentioned the high rate of automobile production as a favorable factor, I would also call your attention to the fact that we are now a witness of a price war in the automobile field, and I am sure that every paper merchant has had sufficient experience in this class of warfare to enable him to see that this is not a healthy condition.

When I say to you that there were 4,000,000 more automobiles registered in 1925 than there were telephones, it may give you food for thought.

Installment Buying

The other unfavorable factor I would classify under the *group of installment buying*. This development in business has increased tremendously during the last four years, and has not yet I think been put to the test of a real declining market.

While installment buying does not immediately affect the paper business, general business conditions, as you know, always indicate what we may expect in the paper market. Now that almost every article used by the ultimate consumer can be bought on time, it remains to be seen what will

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happen if the incomes of those who have entered into these installment contracts is curtailed.

As I said before, this phase of our industrial activity has as yet never been put to the test, and I simply raise the question for your consideration.

Having presented these two sets of factors, one favorable and the other unfavorable, it seems logical that we should be able to deduce a conclusion from them.

It has been predicted by some of our economic forecasters that general price levels will remain about the same and that the volume of production will probably hold up at least the first three months of his year. The late spring months may show a downward trend both in price and volume, but in all probability this decline, if it does occur, will not be drastic in extent.

Encouraging Indications in Wrapping Paper Field

There are numerous indications of the fact that members are becoming more and more curious to the details of their own business. This is the first step towards eliminating some of the ills which seem to have fastened themselves upon our industry. Figures of other houses are never clearly as convincing to an executive as the figures of his own particular house.

It has been our experience time and time again to hear executives say "That all may be true, but in the case of 'my' house it is different."

In Association work I have found that while these differences undoubtedly exist, the net result is about the same, and one house is subjected to practically the same influence to which others are subjected.

As the result of the meetings last fall, a number of houses have investigated the subject of the proper way of compensating their salesmen, with many interesting results both to themselves and to the Association.

It has been stated that the important factor in merchandising is not how much your customer buys but how he buys it. This principle is gradually gaining recognition throughout the trade, and with the recognition of this as a fundamental principle, increased efficiency is bound to result.

Surely a simple example will illustrate how true is this principle. For example, if you should sell a million dollars worth of goods in one dollar sales, there is not any one here present who believes that with your present organization and method of distribution you could make any profit on this volume of business, and yet if this same amount of business, namely, a million dollars' worth of business, was achieved in, say, four sales of $250,000 each, you would undoubtedly realize a handsome profit, and the difference between the profit in one case and the loss in the other, on the same amount of business, would be the difference in the expenses brought about in filling the orders.

Fluctuations Less in 1925

An interesting fact that is noted on one of our Association charts is the narrow range of price fluctuations in the wrapping paper business during the year 1925. In years previous the high peak attained in March was very much in excess of the slump which usually occurs in sales in July and August, but this year the fluctuations have been materially lessened, and it is predicted that in years to come, as the business becomes more stabilized due to more intelligent business methods and merchandising methods, the peaks and the valleys will be less distant.

The manufacturers, of course, can be materially helpful in bringing about this condition through a more careful supervision of production schedule because, after all, the high peaks and valleys are most always due to speculation or forward buying the early part of the year, followed by an over-production in the summer months. (Applause.)

Twine Committee Appointed

ASSISTANT SECRETARY HIGGINS: The Executive Committee was called to order by Mr. Mallalieu. The topic which we wish to report to you is in regard to the organization of a Twine Division. That suggestion was made, and a questionnaire was sent out to determine whether or not there were sufficient members who operated separate twine departments to organize a twine division of this association.

It was found that such was not the case but it was felt that it was of sufficient importance to appoint a committee to handle any matters regarding twine, and it is the recommendation of the Executive Committee that you authorize the appointment of a committee of seven to handle any matters which may come before it in relation to twine.

SECRETARY RIDGWAY: As a matter of fact, the Executive Committee actually created a committee on twine and desires that this Association approve of this procedure on its part. This is the intent back of the action.

CHAIRMAN MALLILIEU: Gentlemen, in my report I referred to two committees that had done good work. I was sincere when I said they had done good work. We will hear first from Mr. Matt O. Byrne of Boston on what he has done as Chairman of the Bag Committee.

Simplification of Bags

M. O. BYRNE: Mr. Higgins says that we still have the bag business with us. I think he is quite right from what I know of it.

Mr. Chairman and Gentlemen: Your Committee on standardization and Simplification of Paper Bags had a final conference held at the Department of Commerce, Washington, on May 26th, at which representatives of all interests were present.

It was decided that under the existing conditions the numbers put on grocers' bags conveyed little or no real information. The committee was informed of an arrangement entered into with the Bureau of Standards, subject to the approval of the conference, for various classes of paper bags. An emblem has been designed, the use of which will constitute a guarantee by the manufacturer that the product on which it appears conforms in cubic capacity to the standards on file at the Bureau.

The conference unanimously endorsed this plan and directed that the list of capacities as submitted by the committee be filed with the Division of Weights and Measures as the approved standards for the trade. By the adoption of this program there will be eliminated 1,215 of the 6,280 different brands and sizes of grocers' bags. An estimated annual saving of approximately $600,000 in paper stock alone will be possible, with the elimination of approximately 28.6 per cent of the varieties and sizes of self-opening bags, and 20 per cent of varieties and sizes of square and flat bags.

The manufacturers have made a very careful study of the situation and found a variation in sizes of bags of from five to twenty-five per cent, from what is universally accepted in the bag business as a standard size bag.

A simplification of the product is another very important step which was also accepted as it affects the turnover of the merchant's stock. Therefore, varieties of grades were reduced so that your stock will represent as near as possible the retailer's needs.

This program, gentlemen, that was adopted in Washington, is, in my opinion, one of the most constructive programs that has ever been taken on by the Grocery Bag Manufacturers Bureau or the merchants. We had a most interesting conference. We had the great privilege of being addressed by Mr. Hoover, who is a great enthusiast in the movement.

You probably have a list of the sizes that were eliminated from the Secretary's office, but I will briefly go over them here: Elimination of sizes on self-opening bags: three-quarters size; one and one-half, seven, eleven, thirty and thirty-five pound. In some localities that will not affect the sale of grocery bags at all.

Elimination of sizes on square and flat bags: one-half, eleven, thirty and thirty-five pound. So you see really there aren't a great many sizes to be eliminated.

Before the simplification program, there were twenty-one sizes of self-opening bags, and the elimination of six makes the recommended sizes now number fifteen. Before simplification of the

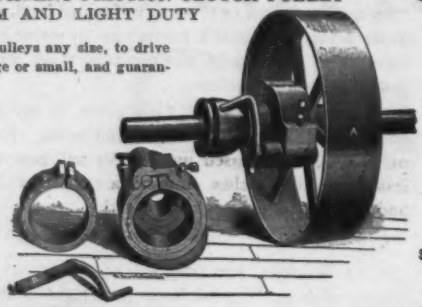
FRICTION McMAHON CLUTCHES

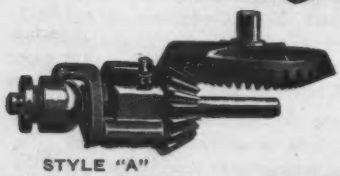
"They Save Power and Belting"

STYLE "A" PATENT FRICTION CLUTCH PULLEY FOR MEDIUM AND LIGHT DUTY

We can furnish Friction Pulleys any size, to drive any amount of power, large or small, and guarantee satisfaction.

In ordering Friction Pulleys or cut-off Couplings give the number of revolutions, size of shafts and horse-power, as near as possible.





FRICTION CLUTCHES FOR ALL KINDS OF GEARING.

STYLE "A" FRICTION APPLIED TO BEVEL GEARS

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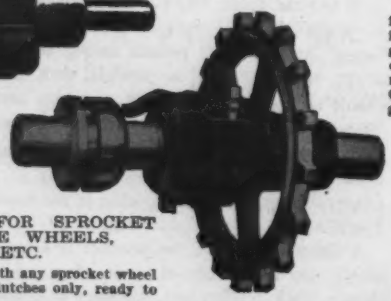
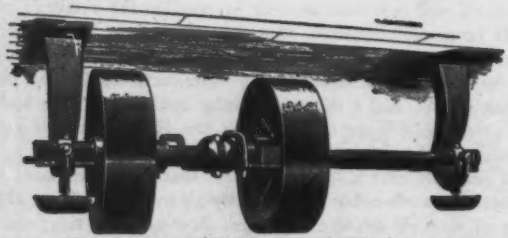
FRICTION CLUTCH COUPLINGS

For connecting and disconnecting lines of shafting without stopping the power. Simple, powerful and durable.



FRICTION CLUTCH FOR SPROCKET WHEELS, SHEAVE WHEELS, PULLEYS, ETC.

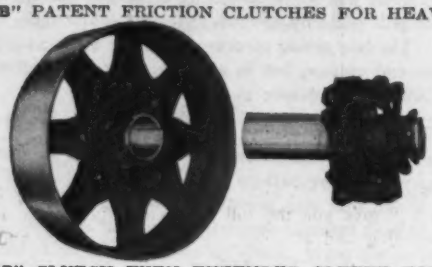
We can furnish this Clutch with any sprocket wheel which may be specified, or Clutches only, ready to apply to sprockets, etc.



STYLE "A" REVERSING COUNTERSHAFT

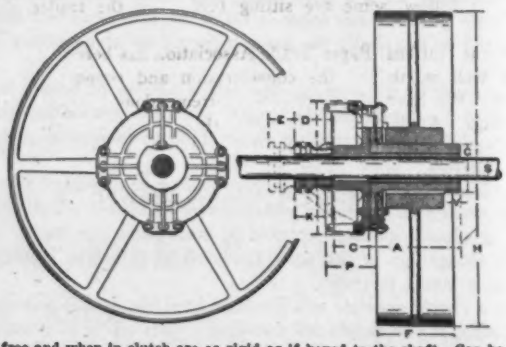
WE SELL OUR CLUTCHES SUBJECT TO APPROVAL OF THE BUYER, AND GUARANTEE THEM TO GIVE ENTIRE SATISFACTION

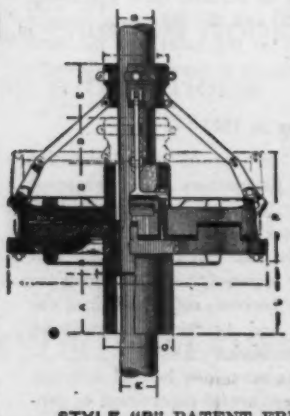
STYLE "B" PATENT FRICTION CLUTCHES FOR HEAVY DUTY

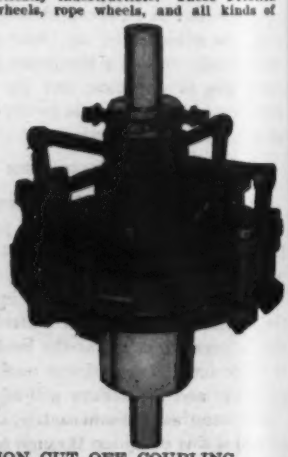


STYLE "B" CLUTCH WITH EXTENDED SLEEVE FOR STEEL, WOOD OR IRON, SPLIT OR SOLID PULLEYS.

This clutch has been found unusually satisfactory on drives where the work is severe. Its power is unlimited and its operation is perfect; there is no shock or jar on machinery when starting or stopping; it will run satisfactorily at any rate of speed that is practical for any loose pulley to run. When out of clutch they are perfectly free and when in clutch are as rigid as if keyed to the shaft. Can be thrown in and out of clutch without slacking speed of motive power. Will start heavy loads gradually, while running fast, without injury to the clutch or machinery. All clutches are provided with friction pads which prevent cutting or wearing of the metal surfaces and make the friction practically indestructible. These Friction Clutches are also furnished for sprocket wheels, rope wheels, and all kinds of gearing.







STYLE "B" PATENT FRICTION CUT OFF COUPLING. POWER UNLIMITED.

This Friction Clutch has more driving power, operates easier, will require less repairs and give better satisfaction than any other clutch on the market. The metal surface will not cut when starting heavy loads.

McMAHON & CO. - - WORCESTER, MASS., U. S. A.

SIMPLE - POWERFUL AND DURABLE

square and flat bags there were twenty sizes; it is recommended that four be eliminated which leaves sixteen.

On December 15th, gentlemen, this program of the manufacturers and the Grocery Bag Service Bureau went into effect, and I have tried to keep careful watch of the situation, to see how it affected the trade, especially in so far as New England is concerned. I have found that it needs the cooperation of all the merchants.

This is a movement which in my opinion is a forerunner for movements which will follow in the National Paper Trade Association. If this movement is successful, there isn't any question but that all other movements for the standardization and simplification of various lines which it handles will go over.

Recently, Mr. Mozier has issued a sales manual. It gives about every question in here that will be put to your salesmen to answer, and I would suggest that if you haven't got one of these sales manuals, that you immediately connect with Mr. Mozier at 53 Park Place, and he will send you a supply of these sales manuals. This will give you the full instruction on how to measure bags, self-opening and also the square and flat bags and be of great help to your salesmen. But this little book is not enough. You have got to go at this thing in a way that is going to assure success.

It has been my opinion a great many times that a movement of this kind usually falls on the shoulders of the few. Some are willing to follow, some are sitting behind on the trailer, so to speak.

Now, the National Paper Trade Association has before it a work that is well worthy of the consideration and support of every member. We have in the country a tremendous consumption of paper bags. At the same time, presently we have an over-production of paper bags, and really I think it is more of an over-production of machines than paper bags, because machines are idle and when the demand comes along, of course these idle machines will start up and increase the production which will not have any very good effect on the market. However, as merchants, it is up to us to see that we buy our bags of manufacturers that put on these labels, and the labels must be on every 500 bags, in addition to being put on the original shipping bundle.

If we cooperate along these lines, I believe that a year from now we will find that the paper bag industry will be in a more healthy condition. I thank you! (Applause.)

Trade Customs Committee

A. J. CORNING: Mr. President and Gentlemen: Your Committee have met three times, twice with the manufacturers and once singly, and, after a great deal of discussion on the matter of wrapping paper trade customs, the following draft has been approved by those two committees, and it is now up to you gentlemen to approve it.

So I will proceed to read the entire set of trade customs as they have been approved by these committees, and I would ask you to make any notations that occur to you that you want to discuss and bring them up after the entire draft has been read. Then we can have a free and open discussion on them.

Trade Customs Affecting Fourdrinier Wrapping Paper Krafts, Manilas, Fibres and Bogus

1. USES OF PAPER:

All orders for Wrapping Paper are accepted for wrapping purposes only unless otherwise specifically stated.

2. BASIS WEIGHT OF MANUFACTURE:

All Wrapping Paper is made on a basis of 24 x 36—480 count only.

3. BILLING WEIGHT:

All Wrapping Paper is billed at actual scale weight, including twine, wrappers, plugs and chipboard or strawboard cores, which are not returnable. Iron and metal tipped fiber cores are charged for, but are returnable to price charged when returned freight paid.

4. COMMERCIAL DELIVERY:

An average of five per cent over or under basis weight on any item ordered constitutes good delivery. On special orders of five tons or less overruns and underruns not exceeding ten per cent, constitute good delivery. On special orders exceeding five tons overruns or underruns not exceeding five per cent constitute good delivery.

5. MARKING AND LABELING:

No package shall be marked, stencilled or labelled by the manufacturer with other than the actual dimensions basis weight or contents. Where distributors require rolls or bundles labelled with their own brand name, labels are supplied by them express prepaid, or if made up by the manufacturer are charged for at actual cost.

6. BASIS OF PRICE:

The prices at which Fourdrinier Wrapping Papers are quoted or sold, shall be based upon paper in rolls of a diameter of not less than nine inches, and of a width of six inches or wider, and on the following basis weight:

For Krafts:—24 x 36—480—30 lb.

For paper lighter than 30 lb., basis weight down to and including 25 lb., 25c per cwt. shall be added to basis price.

For Manilas:—24 x 36—480—35 lb.

For paper lighter than 35 lb. basis down to and including 30 lb. 25c per cwt. is added to basis price. For paper lighter than 30 lb. down to and including 25 lb. 75c per cwt is added to the 35 lb. basis price.

For Dry Finish:—24 x 36—480—30 lb.

For paper lighter than 30 lb. basis down to and including 25 lb., 25c per cwt. is added to basis price. For paper lighter than 25 lb. basis down to and including 20 lb., 75c per cwt. is added to the 30 lb. basis price.

For Water Finish Sulphite Fiber ..... 40 lb & up.
For Water Finish Butchers Fiber ..... 50 lb. & up.
For Dry Finish Butchers Fiber ..... 40 lb. & up.
For *Bogus Papers*—24 x 36—480—70 lb. & up.

Price lists are based on *carload lots, f.o.b. Mill.*

A carload is understood to be the minimum established by railroad tariffs to the point of destination.

A pool car is one which contains merchandise invoiced to more than one customer of the Mill.

For less carload lots an extra charge of fifteen cents per cwt. shall be made, whether shipped L. C. L. or in pool cars.

7. COLORS:

Basis prices are upon natural colors. Extra charges are made for colors, dependent upon costs. The manufacturer does not obligate himself to give other than a commercial match in color required by the customer nor to furnish any color guaranteed to be fast to light otherwise unless specifically agreed upon. The minimum run in special orders is not less than five tons.

8. CUTTING AND FINISHING CHARGES FOR SHORTS IN STANDARD PAPER STYLES:

150 sq. in. and larger, 25c per cwt. over the price in rolls.

Under 150 sq. in. to 72 sq. in., 50c per cwt. over the price in rolls.

Under 72 sq. in. to 36 sq. in., 75c per cwt. over the price in rolls.

9. CUTTING CHARGES FOR ROLLS:

Rolls 9" in dia. or greater] None	
" 6" width or greater	
" 6" dia. and less than 9" diam.	25c per cwt.
" 4" dia. and less than 6" diam.	50c per cwt.
" 2" dia. and less than 4" diam.	75c per cwt.
" 4" width and less than 6" width	25c per cwt.
" 2" width and less than 4" width	50c per cwt.
" 1" width and less than 2" width	75c per cwt.

10. PACKING CHARGES:

Skeleton Frames ..... 25c per cwt.

THE 1926 ECONOMY EXPRESS

has started on its journey through this continent, having as passengers men of the pulp and paper industry who, in 1925 and years before, installed the BRINER ECONOMIZER in connection with their paper machines.

WILL YOU BE ON THE 1927 EXPRESS?

J. O. ROSS ENGINEERING CORPORATION

Main Office—30 E. 42nd St., New York City

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ROSS ENGINEERING OF CANADA

NEW BIRKS BLDG.
MONTREAL

Skeleton Frames (none less than $2.00)
Solid cases ——— 50c per cwt.
(No cases less than $2.00)

11. SPECIAL EXPORT PACKING CHARGES:

An additional charge for export packing according to customer's requirements is made on basis of cost.

(The foregoing additions to basis price for weights lighter than basis, extra for less than carload lots, colors, cutting and finishing charges for sheets in standard sizes, cutting charges for rolls and packing charges are made to cover the additional cost of such services and are based on cost data available.)

12. TERMS OF ACCEPTANCE:

Orders are accepted subject to delays due to strikes, accidents, fires, or other causes beyond the control of the manufacturer.

Orders from dealers are accepted only when accompanied by specifications giving quantities, sizes, weights, and count, with a date for shipment not beyond 45 days from the date of the order, unless for special reasons otherwise specifically provided in the acceptance. Changes in specifications are allowed if provided for in the order as accepted and if stock has not been made.

Orders are not subject to cancellation or changes after acceptance without written consent.

Orders from converters are accepted only for a definite tonnage and over a definitely stated period.

In the case of sales f.o.b. mill, whether with or without freight allowance, claims for loss or damage in transit are required to be made by the purchaser against the transportation lines.

Claims for defective paper, if any, are required to be made promptly on discovery and all such paper shall be set aside for examination by a representative of the manufacturer. No claim of any kind shall be considered unless made within thirty days after delivery.

Experience has shown that exceptional cases occasionally arise where the fault is clearly with the mill and where an absolutely literal enforcement of Trade Customs No. 12 would work injustice and hardship to the merchants. It is therefore, understood that mills will enforce the spirit of this Custom, deciding exceptional cases upon their merits and according to the rules of equity.

13. TERMS OF SALES:

Terms are f.o.b. Mill, net cash 31 days from date of invoice, of 2% discount if cash is paid within 30 days from date of invoice.

14. These Trade Customs do not purport to embrace customs relating to specialties.

"THE FOLLOWING TRADE CUSTOMS WERE RECOMMENDED BY THE MERCHANTS AND ARE AT THE PRESENT TIME BEING CONSIDERED BY THE MANUFACTURER."

For Printing Purposes

Flat Manilas and Kraft:

Shall be billed at nominal weight and an average variation of five per cent over or under basis weight on any item ordered shall constitute good delivery.

Cutting and finishing charges for sheets, etc., if trimmed, add not less than 5c per cwt. per side.

M. G. Papers

There was a separate draft of trade customs for M. G. papers. The trade customs on M. G. papers are practically the same as the copy which I have just read you and of which you have all had copies sent you from the Chicago office in the Bulletin recently.

There was some discussion as to the feasibility of allowing the basis of weight on M. G. papers to remain at twenty-five pounds while the Fourdrinier list was fixed at thirty pounds, but the manufacturers offered a very reasonable explanation of that.

Gentlemen, that embraces the trade customs. The matter now is before you for discussion and determination, whether you approve of the action of this committee or not.

Wrapping Paper For Printing

SECRETARY RIDGWAY: I would like to clear up one point, Mr. Corning. Didn't I understand that there was to be added to wrapping purposes, that it was to be packed 500 sheets to the ream?

MR. CORNING: I don't think that that was very clearly brought out, but I think it should have been.

SECRETARY RIDGWAY: I sat next to Mr. Whittemore, and that was his understanding of it in private discussion I had with him.

MR. CORNING: I thank you for that reminder, and I don't see any reason why we should not write that in at this time, because this matter will finally be passed back to them for their approval and ratification, if it is ratified here.

Differentials in the Roll

A. W. BLACKMAN: I would like to recommend to this committee that some reference be made as to the differential in rolls. It doesn't seem as though any provision has been made there for mill rolls, rolls of a mill diameter, where they approximately fit the machine. There was a great quantity in the way of tonnage used for converting purposes, and it would seem to have been the custom with a great many mills with whom we have dealt, that an allowance is made to us of at least a quarter of a cent a pound where rolls are taken at mill diameter for converting purposes.

VICE-PRESIDENT MALLALIEU: Is that a trade custom or a condition? I don't see that it is quite a trade custom. I have talked with a number of people in the South who make fourdrinier. I talked to a manufacturer who said that originally the customs provided for a quarter of a cent differential, but he objected to it. His contention was that it costs more to make jumbo rolls for converting purposes than it does for paper in rolls for the merchant's use. Frequently the goods are rejected because of imperfections and they have claims on their hands, whereas the merchant can use those with a small degree of loss to the mill. I believe they have left that out on purpose.

I know in the past in New York City that some of the bag manufacturers have gotten side runs, or they have cut up rolls that were not perfect in the wrapping paper sizes, and it demoralized the market at certain times. That has happened two or three times. But nothing was brought up about that, and I can't see for myself that that is a trade custom.

MR. BLACKMAN: But nevertheless the manufacturers have conceded to the converters that differential of a quarter of a cent a pound, and their excuse has been that it was the fact that it was a jumbo roll.

MR. CORNING: These trade customs are for wrapping papers, not for converter's papers, and they have made that concession, as you say to the converters, and that concession goes right through, whether it goes directly from the mills to the converter or whether it goes through the dealer. I don't think you have anything to worry about in that respect because these are strictly wrapping paper customs, and this so specifies.

MR. BYRNE: Do I understand that a paper merchant that buys a jumbo mill roll will get that allowance of one quarter cent?

VICE-PRESIDENT MALLALIEU: There is nothing in the converter. That is my attitude and I think, with all due deference to the Committee, they have done thoughtful and hard work and I don't want to make it any harder for them but we are granting a whole lot to these manufacturers not only in coarse but in fine papers. Every day, they are encroaching on the merchant and it is all wrong from my standpoint. I hope nothing will be done here today that will belittle the merchant's position,

THE ALBEMARLE PAPER MANUFACTURING COMPANY

Hollywood Mill—Brown's Island Mill

BLOTTING—KRAFT—SPECIALTIES

RICHMOND, VA.

Established 1887

Blotting Papers of Every Description

PLAIN—COATED—EMBOSSED

"DIXIE" KRAFT

certainly not in favor of the converter who is a direct buyer from the mill. (Applause)

Three Ideas Advanced

After a lengthy discussion these remarks were made by Mr. Ridgway:—

Mr. President, in order to clarify the situation, there have been three ideas advanced, as I have listened to the discussion: One, by eliminating reference to converters in the trade customs as presented by the committee. This question has been eliminated due to the fact that the statement is definite that these trade customs apply only to paper for wrapping purposes. The second idea seems to be that we should have a very general or rather a clause put in here which in its terms is general and will make in substance conditions that now apply to converting roll business apply also to the paper merchant. And the third idea is that we should get in a definite 25 cents a hundredweight. If we can in some way get these three matters so that a vote can be taken on them, it might be desirable to do it. Perhaps by talking up Mr. Wolbrett's amendment to the amendment first, you would eliminate one of the ideas at least that clears the situation there, or would it be acceptable for somebody to get together in the anteroom and draft a resolution that would bring up specifically these ideas because I think that is all there is to it at the present moment.

SIMON WALTER: Mr. Miller's suggestion that the paper merchant get every advantage that is given to the converter would cover the situation in its entirety. We all show a disposition to work with the mills and I don't think the mills are going to refuse an opportunity to cooperate with us.

Committee Appointed

VICE-PRESIDENT MALLALIEU: We are not making much progress and I am going to ask if three gentlemen will go out and draft up one resolution—forget the amendments, draw up this resolution to cover this thing we are discussing: Mr. Floyd, Mr. Blackman and Mr. Wolbrett. You have all ideas along the same line but a little different. I don't think that it will take you three or four minutes to draw up a resolution there that will be acceptable to this body. I might add Mr. Corning, as chairman of the committee, would do well to go out with these three gentlemen. Is there any other discussions of things in trade customs for discussion that Mr. Corning will be needed for, or should we suspend this matter until the committee comes back?

VICE-PRESIDENT MALLALIEU: The committee has returned with a report. I would like to hear the results. I think the Trade Customs is one of the principal things for us today.

The Resolutions

MR. CORNING: Your sub-committee has drawn the following resolution that we hope will cover the situation as it presents itself:

RESOLVED, that trade customs as submitted by the Trade Customs Committee be amended by striking out the provision in Section 12, reading as follows: "Orders from converters are accepted only for a definite tonnage and over a definite stated period."

"RESOLVED, that the customs as amended be approved and endorsed subject to the definite understanding that the customs do not apply to rolls for conversion purposes and that they are not intended to change present practice in the sale of such rolls.

"BE IT FURTHER RESOLVED, that the matter of converter rolls be referred to our Trade Customs Committee to the end that a section be added to the customs providing for a differential of twenty-five cents per hundred weight in favor of such rolls.

WALTER SEINSHEIMER: I move its adoption.

VICE-PRESIDENT MALLALIEU: Any discussion or objection regarding other clauses of the Trade Customs as read by Mr. Corning, Chairman?

MR. STONE: Is it my understanding if they are adopted, they are to be put in force by the mills?

VICE-PRESIDENT MALLALIEU: We have been assured 98 per cent of the mills are in on this.

Not True in New England

MR. STONE: I understand a lot of things mentioned in there are in use in different parts of the country, such as the differential on direct shipments. It certainly isn't true in New England. We only deal with one mill which makes additional charge for sheets. It seems to me that it is a serious thing to put a burden of this kind upon a section of the country where we haven't had any demands for any such thing. Since those sheets were sent out a week or so ago, I talked with as many New England mills as I could. I can't find there is any demand for this differential on sheets. Some of the mills are so foolish they ship 100 pounds direct. Another thing which is serious is the establishing of two per cent discount. In New England we have some mills which give us 3% and another 2½%. It is serious to us to stand a loss on this particular matter because it is in a way, a personal matter.

On the cutting charges, that is a thing that can be passed on to the consumer. I suppose in cases of this kind, the good of the whole has to govern. Although we had an able representative of our section of the country on the committee, it doesn't seem enough consideration has been devoted to New England. If you go for twenty miles out of Boston, you can't tell where one city ends and the other begins. A large portion of our business is direct. If we have to compete with the small jobber in the smaller cities and have this additional fifteen cents put on, it is going to work a hardship on us.

Customs For Less Than Carloads

MR. CORNING: One important point Mr. Stone has made is the customs in relation to the less than carload lots.

Now in discussing that particular paragraph, it was brought to the attention of the committee of merchants that there was an extra expense incurred by a manufacturer shipping in L. C. L. shipments and he was entitled to be paid for that expense. The reference to pool cars, which was inserted in there by the Merchants' Committee for this reason, that so many instances of mills selling direct to all sorts of buyers in certain congested cities, just as you speak of Boston, that any small dealer could operate at a disadvantage to the large dealer who carried a mill's merchandise.

To make that a little clearer, if I am stocking and merchandising, I will say, Claremont line of paper and putting my expense in on it, my selling expense, my warehousing and every other expense that goes in as you folks have been told in the "Net Profit Control," I can't merchandise that mill's goods as cheaply as my competitor who does not carry that stock of merchandise. If he is allowed to come in with pool cars and take the same price on the article and go out and sell it in competition to me. Instances have arisen where one merchant had built up a trade on certain mill's goods. The pool car situation broke that all down in favor of the merchant who didn't carry the stock. He simply gave his order to the mill and they shipped it in a pool car to destination, our city, we will say, and it was sent direct to the customer. It is a protection to the merchant.

The manufacturers have made it very clear and stated as a positive fact that it costs them more to make L. C. L. shipments than it did. I can't believe this is going to work a hardship on any merchant if it is a trade custom because it puts every one on the same basis. The cash discount, Mr. Stone, I don't believe I am qualified to discuss.

MR. BYRNE: We had a meeting in Boston a few weeks ago and Mr. Stone happened to be the Chairman of the meeting. I remember he was the one who brought up the pool car and L. C. L. shipments. I spoke in favor of it at that time, stating we were troubled with small dealers who were bothering us, had

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Register Bond
Cup Paper
Lace Paper Stock
Waxing Stock
Bleached Tablet

THE PARKER YOUNG COMPANY MANUFACTURERS Established 1843

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Groundwood Tablet
Coating Stock
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SALES OFFICES

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shipments coming in there for two hundred pounds, three hundred pounds, and my friend Robert there was in favor of shutting them out. I am surprised he should be against it at this time. I am heartily in favor of the recommendation as submitted by the committee on that particular point.

MR. POWER: As Mr. Byrne has said, Mr. Stone was the man who advocated that and was strong for it. Mr. Corning will bear me out, I fought hard for 25 cents. We thought it unwise to have such a spread of 10 to 25 cents. We wanted a fixed overhead charge when we were figuring on orders. So that we would all be figuring from the same basis. The pool car issue has been one that has been a great evil in our market and we gain a great deal more on the pool car end of it than we will lose on the direct mill shipment, by giving the fifteen cents.

VICE-PRESIDENT MALLALIEU: Gentlemen, any further discussion?

MR. HELMER: I would just like to ask a question in reference to cash discount matters. Very cogent reasons were given why the discount to the merchant on fine papers should be raised and I don't see myself why those same arguments wouldn't apply to the wrapping paper as well, because our discounts are taken on our purchases and given on them.

SECRETARY RIDGWAY: The argument isn't quite the same. The same arguments that were presented for the fine paper were in the old days presented the wrapping paper manufacturers when they first began to change and they didn't appeal, that is all; they just didn't appeal as real reasons for maintaining the 3 per cent.

MR. STONE: There are, as I understand it, some wrapping paper mills who still give 3 per cent and we are just going to lose 1 per cent on those. Why not leave the matter as it is.

Handle Many Broken Bundles

MR. EATON: Many jobbers handle more small orders than they realize. By small orders, I mean broken bundles. In order to carry out this quarter of a cent we should carry it forward to our customers. It may seem a small thing, but supposing it is only two cars a week of one class of goods that is 100 cars a year, twenty tons per car, that is two thousand tons at $5.00 a ton, that is $10,000. If we don't get it out of the customer, it is pretty hard to maintain a differential between a price on rolls and a price on sheets on sales where you sell 47 pounds, 104 pounds and small sales like that.

MR. CORNING: Mr. Eaton, I might say there was a real reason for that quarter of a cent on sheets and I believe it was a fair and right and truthful reason, that it costs more to manufacture sheets than rolls. If there was a given tonnage at all times coming into the mill, of equal sheets and equal rolls, possibly we would never have that charge, so that there is a good reason for the extra charge of sheets over rolls. Furthermore, we are asking here reduction for converter rolls because we believe there is a real reason we should receive a reduction of a quarter of a cent for converter rolls. I think your problem is a merchandising problem truly, if you will base your price on sheets and give a quarter of a cent reduction, it will be an easy matter to control it as a merchant. That is the way we do it in our business.

MR. JOHNSTON: One question I would like to ask about the pool car; does that apply to pool cars shipped to consumers or to the dealers?

MR. CORNING: If it is billed to you as a merchant by the mill that clause doesn't apply. A pool car is one which contains merchandise invoiced to more than one customer of the mill.

MR. SHAW: I move that the matter of these trade customs be presented before the local associations at their next meetings.

. . . The motion was seconded . . .

SECRETARY RIDGWAY: It seems to me somebody should add to that,—upon receipt of affirmative motion by all of the local associations, our committee shall have the power to make these effective.

MR. SHAW: I will accept that addition.

Put It Up to the Locals

SECRETARY RIDGWAY: As I understand it, what we are all anxious to do is to get these customs, or a set of trade customs, that is right and proper, effective in the Wrapping Paper industry, and the quickest way to do it now is to get it up to the locals as soon as possible and see how they react after they know what it is all about and have had a chance to give it consideration.

MR. WALTER: I agree with you on that. The only difference is that I don't think it ought to be a unanimous vote of all the associations.

SECRETARY RIDGWAY: It is not unanimous in each association, but unanimous by associations, the totals.

VICE-PRESIDENT MALLALIEU: You have heard the motion of Mr. Shaw properly made and seconded.

. . . The question was put to a vote and carried unanimously . . .

Meeting of The Fine Paper Division

The meeting of the Fine Paper Division of the National Paper Trade Association convened in the Astor Gallery of the Waldorf-Astoria, New York City at 10:00 A. M., Wednesday, Albert M. Miller presiding.

Great Loss in Death of Mr. McQuillen

VICE-PRESIDENT MILLER: The Fine Paper Division of the National Paper Trade Association has suffered a shocking loss in the death of Mr. William Ford McQuillen. Ever since its inception, he has been a tireless worker for the best interests of this Association;—twice president of our national body and always in the forefront whenever any constructive work was to be done for our common good. During this past year, he has been especially helpful to your officers in giving freely of his counsel and time. Up to almost the very day of his death, we were in conference with him as to our plans. In appreciation of his years of yeoman service, in respect to his departed spirit, and as a token of our sympathy for Mrs. McQuillen, may I ask you all to stand in silent prayer?

. . . The members arose for a moment, as a tribute in memory of Mr. McQuillen . . .

Report of Vice-President Miller

VICE-PRESIDENT MILLER: A year ago, Mr. McQuillen from this platform sounded a warning that unless we studied our merchandising problems more intelligently, other interests in the industry might find it necessary to enter into our field, or at least attempt to regulate still further important features of our business. A Survey Committee was appointed to make, with Mr. Schoenbucher's assistance, a comprehensive study of our needs and to suggest a plan for our relief. Their work has been an outstanding feature of our year, and their report and recommendations, through our Executive Committee, will be introduced for your careful consideration later in this session.

It is important, however, to pause at this point and call attention to a few of the difficulties with which our committee have been confronted during this past year.

While we have frequently emphasized the importance of the merchant retaining full control over the sale of his merchandise, especially that portion going through his warehouse, we have found, even with the general acceptance that this is primarily the function of the merchant, it is almost impossible to make any readjustment without taking into consideration the mill proprietary lines. Realizing this, our Committee early last summer submitted their findings and recommendations to certain proprietary manufacturers and asked for their opinion. These manu-

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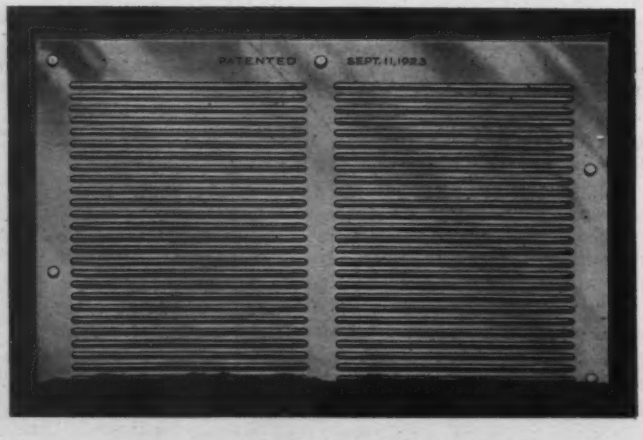

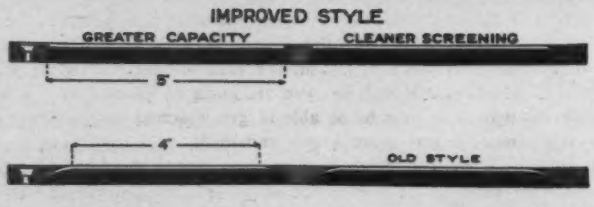

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Cost no more to buy.

Fitchburg Screen Plate Co.

FITCHBURG, MASS.

facturers displayed a fine spirit of real, friendly interest. They at once recognized our need for some relief and demonstrated their desire to assist in bringing about adequate readjustments. Certain of them, however, could not divorce from their consideration of our problem, their own widespread controversy over the relative market position of the different grades. As a consequence, our Committee's work has been seriously delayed and their recommendations have had to be materially modified.

Difficulty in Making Readjustments

The second difficulty which our Committee has met, and which had been forecasted by our previous leaders, has been the growing impossibility for an individual member or separate locality to alone make any readjustments, due to the larger use of proprietary lines and the overlapping of territories. As a consequence, our Committee has had to take their report and findings to the various locals throughout the nation and in order to bring about a national desire to effect the changes and to unite in the general establishment of the principle involved rather than to risk any local trial of the plan, which might mean failure. I mention this, first, because it explains some of the delays we have experienced, but especially because I want to emphasize again our present need for a greater national consciousness on the part of each paper merchant, no matter where located. There was a time when a merchant might stand aloof and follow his own dictates as to his merchandising, but due to the closer unification of our interests; due to the shortening of deliveries by modern transportation systems; and due to our necessarily closer inter-relationship, calling for better and more efficient methods of distribution, we must act unitedly and nationally, hence the difficulty of making any readjustments until we have secured the approval of all our various localities.

We have every reason, however, to feel encouraged for time has not been wasted and as will be shown by the reports of our Committees, there has been, this past year, a splendid showing of fidelity to the National Association work by the various local members. On at least four different occasions representatives from nearly every local association have travelled many miles to sit in conference with the Survey Committee. After careful consideration of the problems before them, they have shown an unusual breadth of vision, a large sense of national responsibility, and have, with never more than one or two dissenting votes, concurred in a line of action based always on national rather than on local or personal welfare. This has been the most encouraging experience on any national work that this association has ever had. Another step in the right direction has been the more frequent getting together of the merchants in the various large localities, thereby affording an opportunity for the interchange of ideas, the creating of a better spirit, and at the same time increasing the consideration and support of the local associations.

A Decidedly Constructive Year

This past year has been a momentous one. It has been a decidedly constructive one for our Association. The future looks bright if we will but assume the responsibility handed to us by our former leaders and go forward, shoulder to shoulder, knowing that we are fighting for only a fair return on our investments and for the service that we render. We want the enthusiastic cooperation of our mills and of our customers and we want a brotherly feeling of confidence in one another. We want each and every member to forget his own immediate and personal interest and to think more of the larger concern of the industry. It has been most gratifying to find in our committee work, numerous individuals who have felt, because of the particular character of their business, the plan suggested might be a handicap rather than an advantage to them, but realizing that it was for the greater good of the industry at large, they have quickly offered to sacrifice their possible advantage and get behind one hundred per cent what seems to be the only step of the National Association to take at this time.

Now, gentlemen, let all of us take hold of this opportunity to retain control of the operation of our own part of the paper industry. Let us go forward on any program that we adopt today, knowing that if we are right in our principle, and without evidence to the contrary, we are at least doing the best we know how, we need not flinch nor be deterred because of a fear as to how it may be received by our customers or suppliers. Our main weakness is in our own lack of unity and stability, and if we will but continue our fight to overcome this, we will succeed in a larger measure.

Good Cooperation

The relations between this Association and that of similar organizations among the printers and manufacturers are cordial, cooperative, and constructive and the prospect for a continuance of this relationship is brighter than ever.

The U. T. A. has some very constructive work under way. The program of their Marketing Committee is a splendid one and will do much, I am sure, to increase the sale of Direct-by-mail advertising. The marketing section, which appears each week in their Bulletin, is a step in the right direction and should materially help their members in the planning and selling of advertising campaigns.

In addition to this, they are establishing schools in the larger localities, in which their members will be taught to find their markets, analyze their markets and from this information, sell their markets, in a more thorough and intelligent way than ever before.

As Vice-President of this Association, and at their invitation, I have attended two meetings of their marketing committee, and I have been much enlightened and enthused by the work they are undertaking. It is worthy of our hearty support. By giving the printers access to our libraries of printed samples and by encouraging them to participate in these local marketing schools, we will be lending material assistance to the U. T. A. in their work, which can but lead to the sale of better printing and more of it.

Permit me in closing to express my keen appreciation and thanks for the splendid services rendered by the other officers, the employed staff. and especially the members of our committees, who have attended many meetings at a great personal sacrifice in time and money. The heritage that come down from the last twenty-five years of service of such men as Mr. McQuillen is placed on our shoulders today and I trust we may have the courage, wisdom, and inspiration to carry on in a manner that will be a just reward for the sacrifices and services of these noble men who lead the way. (Applause)

As the report of the Executive Committee has been embodied in the Report of the Fine Paper Survey Committee, which Mr. Gillet will report on, I am going to ask Mr. Ward to report on it, the Committee of Postal Rates.

Remarks by George W. Ward

GEORGE W. WARD: Gentlemen, I want to thank all you men for the very wonderful support that I have been given as Chairman of this Postal Committee and my fellow members of the Committee. When I was told that I was expected to raise $10,000, I thought that was going to be some job, but every one of you, in every section of the country have come through just 100 per cent, and it is a pleasure, I want to tell you, when you take a job like that and feel you are going to have to give it hours and hours of time, to be able to get it across in minutes. To every one of you I am keenly indebted.

With that amount of money, I presume that you men would like to know something of the past, as far as the situation that has arisen over this postal situation, and above everything else where we go from here. I felt that the plan of getting a speaker to speak for me worked so well in Chicago when Mr Buckley

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This is being accomplished by the use of our LaMotte H-Ion Comparator Set.

To give only one example of the value of accurate control of acidity by hydrogen ion measurements, several manufacturers have been able to cut the amount of alum to one-fifth that ordinarily used to precipitate the sizing, by the use of our LaMotte H-Ion Comparator Set.

For complete information see article on Page 166 of this issue.

LaMotte Chemical Products Company
McCormick Building **Baltimore, Maryland, U. S. A.**

gave a talk which I hope those who didn't hear him have read it, I thought that worked so well, I would give three or four minutes of the fifteen minutes alotted, to a man who has spent one year of solid work on this thing. He has spoken in twenty-two states and over 100 cities and he is the counsel of the National Council of Business Mail Users. The big thing we had to do to get this bill across, was above everything else to unite all of the interests on the first, second third and different divisions of mail. I don't believe our job would have been nearly as hard, had we been able to organize as we are now organized. Every interest of advertising paper printing is back of it, in back of this National Council. We are all going down there for one thing, instead of each one going down for some special interest, and it gives me great pleasure to introduce to you Richard H. Lee, who will give you a short resume of the situation.

Address by Richard H. Lee

Mr. Lee here made an interesting address on this subject which was generously applauded.

VICE-PRESIDENT MILLER: Mr. Lee, Mr. Ward, on behalf of the Division I thank you for that very able appeal, and for the compliment you have paid this Association.

We have invested our money, and I am sure we are going to follow through now and write the letter. Would any one care to make a motion to that effect, or will you all go back determined to attend to it as soon as you get back? I think we come down here frequently, and think we will attend to it when we get home, and then we don't do it. I beg of every man in the room to make a memorandum today that when you get home to write these letters.

MR. LEE: If each man will send me a copy of the letter he writes, I will check it up and tell your secretary just how many letters went through. (Laughter)

VICE-PRESIDENT MILLER: Mr. Lee believes in getting results. I am for you.

This is really a very important matter, gentlemen, to this paper industry. I know we don't have to dwell any more on it. We are all sold on our interest in it as demonstrated by the contribution we have given toward this work, in money. Now let's give a little attention with follow up letters that seem so necessary.

Mr. McLaughlin as Chairman of the Card Board Conference Committee.

Report of Cardboard Committee

MR. MCLAUGHLIN: Mr. Miller, the Cardboard Committee met yesterday and discussed matters of general interest, but as there was nothing of vital importance to come before it, no definite action was taken, nor any recommendation made to be presented to this organization.

VICE-PRESIDENT MILLER: Is Mr. Ross Andrews in the room? Mr. Andrews, will you report for the Committee on Stamp and Envelopes as to the status of the present bill?

Report on Stamped Envelopes

Ross F. ANDREWS: Gentleman, no doubt you have been fully advised of the developments in our campaign to restrict government competition in the envelope business. The Envelope Legislative Committee, with headquarters at Washington, is the clearing house for the National Editorial Association, representing 15,000 small daily and weekly newspapers with job printing plants connected, national paper trades, envelope manufacturers' organizations, and the U. T. A., also other groups who have taken an active part in this movement. We have been at work on this proposition for two years, and our campaign has been intensified during the last twelve months.

The results are now apparent, and I am pleased to report that the Kendall Bill, which we have sponsored, stands an excellent chance of enactment at this session of the Congress.

Our task has not been easy. We have met difficulties which usually attend the promotion of economic subjects when closely identified with political movements. The burden of the campaign has been carried by the N. E. A. with its vast membership in every congressional district. The officers of the organization have given freely of their time and energy to promote this legislation, and have undoubtedly been deserving of more co-operation than they have received from other groups.

I will not take up your time to give a detailed report of the activities, but will content myself with the present status of the Kendall Bill (H. R. 4478).

This bill was introduced into Congress in December, 1925, by Representative Samuel A. Kendall of Pennsylvania. Hearings have been held during the last few weeks before Sub-committee Number Five of the House Post Office Committee. Representatives of the N. E. A. testified at the hearings, and their testimony was supplemented by speeches of more than fifty members of the Senate and House, who appeared in person. Our records show that the publishers have received sufficient number of commitments from the Senate and House to insure enactment of this bill when it is reported to them from the House Post Office Committee.

Hearings are now closed, and the bill is in the Subcommittees. Publishers are doing everything in their power to expedite a report from the subcommittee. The opposition is utilizing its vast resources to keep the bill in subcommittee. It now becomes a struggle between 15,000 American newspapers and allied organizations, and the Post Office Department, assisted by the financial resources of the Dayton contractor.

The publishers notified the Members of Congress that the Postmaster General was taking an unfair advantage of the American press by permitting the Dayton contractor to use confidential government lists of customers, some 500,000 users of government stamped envelopes, for the purpose of circulating propaganda against the Kendall Bill. The Dayton contractor, using the stationery of the Dayton Chamber of Commerce, has circulated to every user of stamped envelopes in the country, the warning to oppose this legislation. They have misrepresented our case by saying that we intended to do away with stamped envelopes entirely while, as a matter of fact, we are only asking for the restriction of government competition by eliminating the printing of special request envelopes.

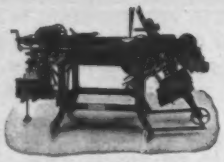
In the Kendall Bill the plain stamped envelopes and the office request or envelope having the skeleton corner card would be permitted.

The last government figures as furnished by the Post Office Department shows a ratio of 49.2 per cent as the total volume of stamped envelopes bearing the special request address.

Publishers and printers have stressed the fact that this is a non-partisan measure and should have the whole-hearted support of the Congress. It seems a pity that one or two men should be permitted to hold up this legislation. Of course, it is easy to discern their motives because anybody familiar with legislative procedure knows that the surest way to kill a bill is to hold it in subcommittee until its consideration is impossible by the full membership.

One of the most surprising developments of this campaign has been the determination of newspaper publishers to continue this fight until justice is assured through a legislative measure. I am informed that many of the publishers have notified the leaders of various parties that they can expect to find the Kendall Bill a disturbing issue at the primaries. Many of the publishers have gone so far as to notify the county chairman and others who will seek publicity for personal reasons within a few weeks that they must pay the usual advertising rates for party propaganda. The publishers feel that if the Congress cannot recognize their claims for fair play that they cannot turn over their columns to partisan publicity.

The success of this legislation will have a far-reaching effect on the paper industry. Efforts have been made in the past to



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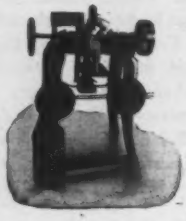

Patch and Metal Clasp Machine

- Metal Clasp Machines.
- Metal Flap and Patch Machines.
- Machines for Paper Towels.
- Phonograph, Wallet and Security Envelopes
- Machines to form envelopes over the enclosure.
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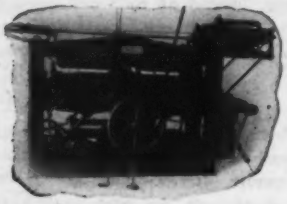

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RE-ORDERS Prove Good Value

No obligation to ask for information on your size rolls

Two of Many Good Rolls

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Belfield Transfer Valves
Iron Body, Bronze Mounted, Screwed

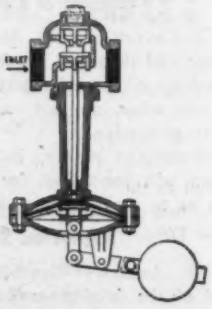
The Belfield Iron Body Bronze Mounted Transfer Valve has an important place in all paper mills, dye houses, nitrate works or any industry which has a heavy, thick fluid to move from one container to another by means of piping.

It has its place also on low pressure air, gas or exhaust steam lines, replacing gate or globe Valves.

The Valve consists of a round cylindrical body, which is bored out on the inside to allow a cradle to rotate with the movement of the stem. As this cradle rotates it covers either opening as the case may require. The cradle is held firmly against the side of the body by a heavy spring.

If the material in your plant clogs up a gate valve, then the Transfer Valve is the Valve to install. It is easily accessible for cleaning or repairing.

Belfield Pressure Regulator
Class B
For Reduced Pressures Not Exceeding 25 Pounds



THE growing demand for high steam pressures necessitates a more general adoption of regulators to reduce the high to low pressures so as to be suitable and economical for purposes such as drying, heating, boiling, etc.

Valve Specialists
H. BELFIELD CO.
435 No. Broad St. Philadelphia, Pa.

establish a government paper mill, and to otherwise engage in competition with private manufacturers. I honestly believe that passage of the Kendall Bill will put a check to those who advocate further extension of government control over industry. The paper industry has not supported this measure as generously as I expected.

While it is true that the printers will derive immediate gain from the enactment of this legislation, the benefits will eventually accrue to the entire industrial world.

To Get in Touch with Congressmen

VICE-PRESIDENT MILLER: I am wondering, gentlemen, if it would not be well for some one to introduce a motion to the effect that our secretary communicate with each member and send out a reminder to write our Congressmen and Senators regarding both of these bills in which we are so deeply interested.

Mr. CLEVELAND: I so move, Mr. Chairman.

The motion was seconded by Mr. Bonestell.

GEORGE WARD: Gentlemen, I want to say that if any of you happen to have a contact with your Senator or Congressman of a personal nature, one personal talk is worth 5,000 letters. There are a great many of you men who can get five minutes with your Senator or Congressman.

This next month is when we need support, both in Mr. Andrew's case and my own. I would suggest that, in addition to the letters, you get a five minute conference with your Senator or Congressman.

ROSS ANDREWS: I would like to say to the gentlemen from the West that Mr. Sproul of Chicago, a Republican, is the chairman of that subcommittee that now has that bill. The hearings on it have closed. Mr. Foss, Republican, of Fitchburg, Mass., is on the subcommmittee. Mr. Hogue, Republican, of Fort Wayne, Indiana, is on the committee; also Mr. Ross, Democrat, of Burlington, Ky., and Mr. Ronjeau, a Democrat, of Macon, Missouri.

I have personal assurances that the two Democrats on there are all right, that they will endeavor to get it out of the committee, but I have no assurances regarding the Republicans.

Possibly some one from Chicago knows this man Sproul personally, and could see him or write him a personal letter that it is the wish of the Chicago voters engaged in the paper industry that this be done. When we hear about competition we realize that there must be an awful lot of them in Chicago. You know that man in Chicago has to get votes. That is the way to reach those fellows. Up in Fitchburg, Mass., I presume there are a good many people interested in industry up there who might reach Mr. Foss.

VICE-PRESIDENT MILLER: Are there any further remarks upon this motion? If not, I will call for a vote. All those in favor will say "aye"; opposed, "no." It is carried.

GENERAL MEETING OF THE ASSOCIATION

The General Meeting of the National Paper Association convened in Astor Gallery, Waldorf-Astoria Hotel, New York City, at 2:15 P. M., Wednesday, J. A. Carpenter presiding.

PRESIDENT CARPENTER: The first business is the report by the president.

Report of the President

This is a meeting of the Officers and Directors, stockholders and employees of the National Paper Trade Association. We are here to report what each one of us have done during 1925 to make this Association a success. You will remember last year we met at separate times from the manufacturers, and while I think the Directors' Meeting, the Committee Meetings and the General Assembly Meeting were better attended than usual. I think we are all glad to be back to a meeting at the same time as the manufacturers, but we must remember that we should all be at each meeting that is held for us and let us be on time and back up our officers and Committees.

There never was a time when the Officers, the Committees and the Staff did more work than this year, but what the result is we must judge for ourselves.

A very important part of the work done this year is the work done by the Survey Committee, both in the fine paper department, as well as the Wrapping Paper Department.

The first part of the year the Survey Committee of the Wrapping Paper Department under the leadership of our Vice-President, Mr. Mallalieu, produced a work called "Net Profit Control" which was one of the best pieces of work ever done for this department, is to say nothing about the three weeks' trip he and the staff took to put the results of this book over.

While many of the illustrations in this book were the results found in Wrapping Paper Houses, they would apply to Fine Paper Houses as well, particularly the compensation for salesmen. You all have these books, and the profits of 1926 to some extent will depand on how close you apply the net profit control to your business.

Your Vice-President, Mr. Miller, has been just as active in the work of the Fine Paper Department. The Survey Committee of the Fine Paper Department headed by Mr. Gillet has certainly put in time and effort, the result of which you have seen at these meetings.

For the year of 1925, the Paper Merchants from the best information that we can secure handled a little more tonnage than in 1924, and the sales in the Fine Paper Department was about 5 per cent more than in 1924, and the sales in the course paper department was about 4 per cent more; these are not very large gains, but it is better to be going forward than backward.

Sold More But Made Less

I have heard since coming to this meeting of men who sold more tonnage than the year before, and they have made less money, also heard of men who sold less tonnage and made more money. Now which of these men do you think need to make a closer survey of their business?

How many of us have made a close survey of our expense account? How many know whether their delivery expense was more in 1924 than it was in 1925?

I know of several houses that are budgeting their warehouse expense, taking the amount of the expenses in that department for 1924, deducting 5 per cent, as the budget for 1925; then they give the foreman of that department the hiring of the help for that department. At the end of the year they gave the foreman 10 per cent of what he had saved in that department, and I know of one foreman who got about $600.00 on that basis.

You know it has been the aim of the paper merchant to make net 5 per cent of their sales. I am not going to ask you how many have done that in 1925, for fear there would be too many hands raised.

Now I want to say something to our membership as a whole about more loyalty to our Officers and Committees. You have heard me say before, and I am going to say it again, that you never get any more out of a bank than you put into it, and the same is true of the National Paper Trade Association.

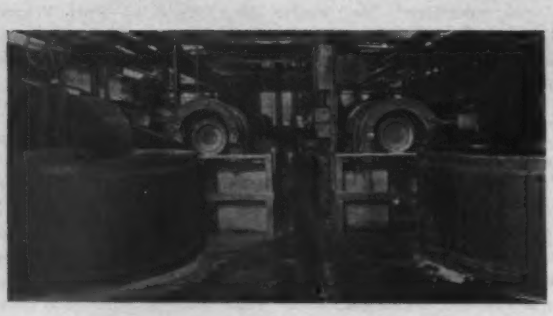
Should Lend Cooperation

Now I think that each member should feel it is his duty to do all possible to assist the officers and committees in every way possible to get as much information, both good and bad, and give it to the officers in a helpful constructive manner.

You must realize that it is impossible for a large body of men to accomplish anything definite on account of having so many different ideas, so this must be done by small committees. We try to select the ones on these committees representing different sections

The Lenix Drive

(Trademark Reg.)



100 H. P. Double Header Motors Driving Beaters

"Elimination of Waste" through improved methods of manufacture was the watchword of industry in the year just past.

For twenty years the Lenix has been eliminating the wasting of power in belt drives caused by slipping belts. The short pulley centers not only possible but preferable with the Lenix result in saving of floor space as in the installation illustrated.

The Lenix is in use in more than sixty paper mills in the United States and Canada. An interesting arrangement of double headed motor-driven beaters which has met with considerable favor in the Paper Industry is described in booklet "The Lenix Drive in the Paper Industry." It may be had on request.

The Lenix is not an idler. It is a "belt wrapper" scientifically applied to belt drives for the purpose of saving floor space, eliminating belt slippage and improving the general capacity of the drive.

Booklets "Saving Slippage and Space" and "The Lenix Drive in the Paper Industry" contain the facts that have induced the sale of thousands of Lenixes and may be had on request.

F. L. SMIDTH & CO.

Engineers

50 Church St. New York, N. Y.

A Cabinet that Releases Towels Easily

This is the outstanding feature of the new high grade cabinet shown above. A specially constructed bottom, protected by patents, permits the use of either crepe or smooth towel—and the towel can be easily released. This feature is part of the cabinet itself. There is no light steel or tin parts in the bottom to accomplish the release of towels. There is nothing in this cabinet to rust.

Made of 20 gauge full finished auto body steel, it is well finished in either nickel, gun metal, white, olive green or chocolate—whatever finish desired. Slot in side to show contents of cabinet. Your trade will be pleased with this cabinet.

Toilet Tissue Cabinet Dispenser

Releases each sheet easily. Specially constructed bottom—a patented feature—part of the cabinet itself makes this possible. No extra parts and nothing to get out of order or rust.

Made of 20 gauge full finished steel, it can be furnished in nickel, gun metal, white, olive green or chocolate—whatever finish desired—a well made cabinet with a fine appearance.

Napkin Dispensers

Whatever your requirements in a napkin dispenser we can make a dispenser to get those requirements. Let us show you what we can do on your dispenser fixture requirements.

Northern Corrugating Company

Green Bay, Wisconsin

of the country; also men who will give of their time and money, and are capable of carrying on the work that is to be done. No doubt Mr. Gillet has put one-third of his energies during 1925 in this survey work, and spent not less than $1500.00 of his own money to carry on this work of the Fine Paper Survey Committee. Then we hear someone say, "I don't know about paying my dues this year, I don't believe that I am getting enough out of the Association for what it costs me." Now I venture to say there is not a man in this room who would have made three-fourths as much money as he did make in 1925 if it had not been for this Paper Trade Association.

To Raise More Money Soon

By the way, that leads me to another subject: We soon will have to have some consideration given to raising more money. You know how your expenses have crept up on you and you don't complain very much if your sales are more and your profits are more. Now we are trying to do a bigger work than ever before, and have not increased the dues, and sooner or later this will have to have some serious consideration.

Regarding market conditions, this past year has been very satisfactory on most lines; there were some soft spots in book paper and news print, some wrapping paper lines particularly early in the summer, but as fall business came on more advertising was placed in the newspapers, catalogues were printed more freely and more demand was made for wrapping paper and prices stiffened up on some of the cheaper grades, while bags are not of a satisfactory condition yet. The result has been there was no loss sustained on inventory.

Taking the year of 1925 as a whole, in some sections was bigger than in 1924, and in others not quite so good, but let us hope for better things for 1926 for the whole Association.

Gentlemen, I thank you. (Applause)

Next is the report of our Secretary.

Report of the Secretary

SECRETARY RIDGWAY: Gentlemen, the outstanding feature of the period since the last annual meeting has been the large number of individual members who have been active in the promotion of the interests of the Association. Never before have so many men been continuously and unstintingly giving of their time, money and brains to the solution of the problems of distribution of paper. The officers generally, and Vice-President Mallalieu in particular, the Survey Committee of both divisions, the Administrative, and Executive Committees of the Fine Paper Division have never in the past been called upon to work as they have worked during the past eleven months. In addition, a number of special committees have shown zeal in carrying out the tasks committed to them. We would estimate that at least one-eighth of the membership has been contributing individual effort for the good of the whole. This fact is exceedingly encouraging for it is unbelievable that any organization which has support of this character can be other than successful. These men, each and every one of them, are deserving of, and, we feel sure have, the sincere thanks and hearty support of the members.

There have been moments of discouragement to those so actively speaking accomplishment but progress in any industry is, of necessity, relatively slow. Business, as well as man, is a creature of habit and is equally slow to change. It has ever and will continue to be composed of radical and conservative, for the radical of today becomes the conservative of tomorrow.

Ideas Vary in Different Sections

The ideas of the East are not in complete accord with those of the West, and of the North with those of the South. The producer thinks one way and the distributor another. Individual producers are not in harmony with their fellow producers as is equally true of individual distributors. The task of bringing about a sufficient unity of thought to produce change, no matter how insignificant, is no light one. Time seems to be the all important factor and it is to be hoped that the individual member who is impatient at delay will realize that real progress is being made and that the desired and much sought for changes will ultimately come. We should not entirely overlook the fact that delay in making any needed change is to be preferred to premature action. Such action would surely add to the delay and might completely wreck all possibility of accomplishment. The programs of both Divisions are making substantial progress and have now reached the point where we can with confidence predict that it is only a question of time before they are successfully concluded.

A Grand Friend Passes On

Three weeks ago, lacking one day, a man went from amongst us; a man dearly beloved by all who knew him; a man who had been a power for good in the industry; a man who, beyond all others, had contributed lavishly of his talents in the upbuilding of this Association; a man whose example will long be an inspiration to his successors in authority, and whose memory will never fade. In the passing of Willam Ford McQuillen there has come to his host of friends a sense of deep personal loss and a keen realization of the privilege which has been theirs through friendship with him.

He was one of the small group who met, as he has so often expressed it, "under the sidewalks of New York" to organize the National Paper Trade Association and in the twenty-one years which have passed since then, he has never faltered in his loyalty to the Association, and to its aims and purposes. He was continuously a member of the Board of Directors from the date of organization until two years ago, when he resigned upon his election as President for a second time. He first served as President from 1908 to 1910, and his second term of office for one year expired with the annual meeting last April.

In all that time he missed but two meetings of the Association and in neither instance was he absent from choice. Only five days before the end, he addressed the members of the Southern Paper Trade Association meeting in Tampa, which he attended at no little personal inconvenience, simply that he might add his bit toward the success of that meeting. Those of you who heard his report last April, which he referred to as his "swan song," for he knew that his days were numbered, can well afford to re-read it. He is no longer with us in person, but his spirit will ever be present.

Two Locals Added

Two local associations have been added to the membership during the past year—the Iowa Wrapping Paper Merchants Association with an individual membership of nine, and the Virginia-Carolina Paper Trade Association. This latter Association is a split from the Baltimore & Southern Association, and was made in the interest of more effectively covering the wide territory within the jurisdiction of the Baltimore & Southern. It was made with the full consent and approval of the Baltimore members and, only after most careful and thorough consideration. The new Association starts with fifteen members and will undoubtedly add to that number within the next year. With these additions, the individual membership of the constituent association is 401, an increase of 18 over a year ago, and a gain of 58 in the past three years. These figures are gratifying but we would urge that the constituent associations continue their efforts to enroll non-member houses.

There is need of a fine paper association in the Southwest but except for this one section the entire country is quite fully covered. We are pleased to report that all constituent associations are in excellent shape and are functioning satisfactorily.

Statistical Work

The Statistical work of the Association has been greatly simplified during the past year and today is confined solely to collection of total sales in dollars and cents on a monthly basis. While the discontinuance of tonnage statistics was perhaps a step backward, it was necessitated by the failure of persistent efforts to popularize

them with a sufficiently large proportion of the business of the whole. This step will be fully justified only if the plan now in operation has the support of the entire membership. At the present time 120 members are regularly reporting fine paper sales, and 97, sales of wrapping papers. This showing is only fair, but before another year rolls around these members should be increased to at least 80 per cent of the membership of each Division. The officers of all local associations are urged to solicit the cooperation of their members for we believe such procedure will be more productive than any that can be taken by National headquarters.

The failure of a considerable number of the members now reporting to forward their reports by the tenth of the month is making it impossible to obtain full value from these statistics. We have been unable to find any adequate reason why these reports cannot be mailed by every member on the tenth and we would earnestly urge all here present to see to it that their reports go forward each and every month by that date.

Trade Statistics

The Department of Manufacture of The Chamber of Commerce of the U. S. recently issued a bulletin on the subject of trade statistics from which we would quote as follows:

"Old jokes concerning 'lying statisticians and statistics' fall flat in the face of our present need of more and better factual data in modern business management and intelligent industrial control.

"Trade associations can render to their workers no more valuable service than perfecting their methods of gathering, compiling and reporting to them and making available to the Government and public, current figures which will give a composite picture of what is going on in the industry. It is on the basis of such facts that not only the producer, distrbutor and consumer may act intelligently but also the Secretary of Commerce is enabled to report the trends of industry and business."

Later in the Bulletin, the question is asked "Why don't we have these vital facts," and, the answer, in part is, "we do, in a number of outstanding and successful lines which appreciate their value."

There can be no higher authority on this subject than the Chamber of Commerce of the U. S. and this Association and its members can ill afford not to give heed to the conclusions above stated.

Sales of Paper

Conditions in the distribution of paper during the past year have been very similar to those existing in the two previous years. Sales of both wrappings and fine papers show an increase in 1925 over 1924, and based on volume the past year was undoubtedly slightly abnormal. Yet, in spite of these increases in sales—three per cent in wrappings and five per cent for fine papers—the net profit results were, in the main, less satisfactory than in the previous year. In this respect, paper merchandising can be classified with the minority for a majority of business in this country returned net profits ranging from "good" to "very satisfactory."

As has been previously pointed out, the factor principally responsible for inadequate profits is the excess of productive capacity of the paper machines of the country over the demand. Such a condition is always attended with price concessons on tonnage business and when prices are unstable, net profits to the merchant are lowered. We can see no relief until demand catches up with productive capacity, except to the extent that the paper merchant as an individual develops the ability to pass up orders whch can be had only at a figure which will return an inadequate net profit.

Hand-to-mouth Buying

We have heard a great deal about "hand-to-mouth" buying since the war. For a year or two after its appearance, it met with general condemnation. Latterly, however, it has been recognized that this form of buying has contributed to the stability of general business during the past three years. It has removed the dangers of over-stocking, and, while under-buying undoubtedly adds to cost, this increased cost is generally preferred to the dangers of over-buying.

Those who have studied this phase of the situation point out that this form of buying has been carried to a ridiculous extreme and unless curbed, will surely lead to disaster. "Piecemeal" is the new term applied to this form of buying. It is somewhat consoling to know that the paper business is no exception to the rule and that the evil prevails in all wholesale businesses. We understand that the wholesale grocery trade has just closed a most unsatisfactory year and that "piecemeal" buying is held accountable.

The paper merchant has at least been alive to the dangers of "piecemeal" buying and has sought and found a remedy, but despite general recognition of the existence of the evil and the efficiency of the remedy, the paper trade does not appear to be quite ready to apply it. We anticipate that this meeting will result in that unity of thought on the part of a substantial majority to make it possible to apply the remedy at a reasonably early date. (Applause).

PRESIDENT CARPENTER: Now we have another treat for you. We will change the program and not have our Treasurer's report now but we will have the address by Mr. E. E. Lincoln of the Western Electric Company.

Mr. Lincoln's address was greatly applauded.

PRESIDENT CARPENTER: Our Secretary made some reference to the death of our good member, Mr. McQuillen, and I will ask Mr. O. A. Miller to give some memorial papers on Mr. McQuillen.

Resolutions on Death of Mr. McQuillen

O. A. MILLER: Mr. Chairman, your Committee consisting of Forest Hopkins, Hulbert Carter and myself have found such a wealth of material, that it was difficult to find anything to be short enough for this occasion. It was a work of love and we hope it may be pleasing to you.

Resolved,—That the following Memorial to William Ford McQuillen be placed upon the records of The National Paper Trade Association and copies sent to Mrs. McQuillen and the Storrs and Bement Company.

Mr. McQuillen was born October 24, 1861, and died February 4, 1926. All of his life was spent in paper merchandising, thirty-nine years of the same with the House which was built largely around his personality.

The Storrs and Bement Company stands as a monument to his enterprise and industry.

He was present at the birth of this Association in New York in November, 1903, and went home to Boston filled with enthusiasm and thoroughly imbued with the spirit of Service manifested in that first organization meeting which had been called by a number of Paper merchants who had the vision and unselfish purpose of improving trade conditions by helping their competitors through the then new idea of cooperation. He assumed leadership in founding the New England Paper Merchants Association, and in 1904 and 1905 during the formation period was President of the New England Association, by virtue of which he was its representative in the National Paper Trade Association. The National Association is indebted to him for many years of sacrifice and distinguished service. He was Vice-President from 1904 to 1908, and President from 1908 to 1910, and again in 1924. He was continuously active in the service of the Association through all the years of its existence until his death.

Every one loved Bill McQuillen and feel his loss deeply, but his work will live and his influence be felt for many years to come.

If every member would follow his example of loyal and intelligent service all should reap untold benefits from the success of this Association, which was dear to his big heart. His outstanding attributes were good fellowship, integrity and industry, coupled with rare qualities of mind and heart. Being steadfast and true to the best of motives in every undertaking, possessing a well trained mind and scintillating brain, with the happy faculty of putting his thoughts into words in his own inimitable manner, expounding his views in conference in a most convincing way, which made him valuable in conference and much sought in Association work. In his

death we have sustained an irreparable loss, but his memory will still stimulate us in worthwhile achievement, if we live up to his standard of loving service to our fellowmen.

Mr. President, I move the adoption of this resolution.

The motion was seconded and carried.

Letter From Pacific States

MR. COLTON: I have a letter here from the Pacific States Paper Trade Association. It reads as follows:

"Upon the presumption that there will be a session during your annual meeting in memory of Mr. McQuillen, the members of the Pacific States Paper Trade Association desire to extend their sincere sympathy through you to his family and friends and to express the great loss the paper trade and each man engaged in it has sustained in his passing on.

"His sterling character, his broad democracy, his firm grasp of business and business principles, the scope and logic of his solid mind, his fearlessness in expression, stamped him as a leader in our ranks. He would have been such in any walk of life and we in the paper business were fortunate in having him one of ourselves and to have had the benefit of his safe advice for so many years.

Few men who reason so soundly and who give expression to their thoughts so plainly but give offense. Not so Mr. McQuillen. Bluff, direct, forceful, unsparing in his opposition, he created no antagonisms. The secret was that like Abou Ben Adhem, he loved his fellow men and we all knew it. Our monument is the universal affection and esteem in which he was held by every member.

"So far as I have seen in print, his last public utterance was his annual address in 1924. I have read it and quoted from it many times. I recommend that every member read it again. Wise and prophetic words, from a far-seeing straight-thinking, keen observing, fearless-speaking man, whose experience and whose judgment entitled him to speak with authority.

"In whatever form a memorial to him may take, the members of our Association desire to be considered participants in recognition of his valuable service to the paper trade and the Association and of him as a man and a friend.

"Pacific States Paper Trade Association

"By (Signed) MR. R. HIGGINS,

"President."

MR. MALLALIEU: As Vice-President in charge of the Wrapping Paper Committee, I would like to make a motion that we all stand with bowed heads for half a minute out of respect to Mr. McQuillen.

. . . The audience arose and stood for a moment with bowed heads, as a tribute to Mr. McQuillen . . .

Letter From Lineaweave Association

SECRETARY RIDGWAY: There is a letter also that might be read into the record at this time. It is addressed to the National Association, and signed by the Lineaweave Announcement Association. It reads as follows:

"The Lineaweave Announcement Association, composed of Paper Merchants, Mills and Converters in regular session this morning, February 22, extends to you its sympathy, deeply regretting your loss and the loss to the Paper Trade throughout our country, in the death of your immediate Past President, W. F. McQuillen.

"His sincerity and devotion to your Association will always be a page in your history deeply engraved on the minds of your members and inestimable to the industry. Deep regret is expressed by all members assembled."

Executive Control Committee

PRESIDENT CARPENTER: Next on our program is Paper: Executive Control. Mr. Schoenbucher.

N. A. SCHOENBUCHER: Gentlemen, on many occasions merchants have asked me whether or not a way could be found to accurately gauge the tangible results of good or poor management on the part of the various executives and sub-executives employed in a paper house so that a merchant may effectively reward those whose services are exceptionally meritorious.

It goes without argument that if a "piece work" basis of expense appropriation for all departments were practicable to use in paper house management, such a basis would exactly meet the foregoing.

I, therefore, submit here for your consideration, study and use such a piece work basis which is sound and practicable, and which can be adopted by any paper merchant with very little clerical expense (not over several hours per month of one person's time). This plan of executive control is entirely new in the wholesale field, so far as I know and I am therefore unable to point to anyone who has it in use. Two members of this Association were given advance copies of this paper and have evinced a deep interest therein.

Let me briefly explain that this paper was prepared in haste, due to the pressure of many other matters of immediate importance. Sometime in the near future it can be improved and expanded in order that both the principles and detailed workings of the plan may be more clearly understood.

Let us consider each operating phase, or functional part, of a Paper Merchant's business and the problems it has constantly to solve.

Briefly, net profit arises from a manipulation of the working assets of the business and from the control of, what we might call, the physical operations performed on all buying and selling transactions.

Liquid Assets

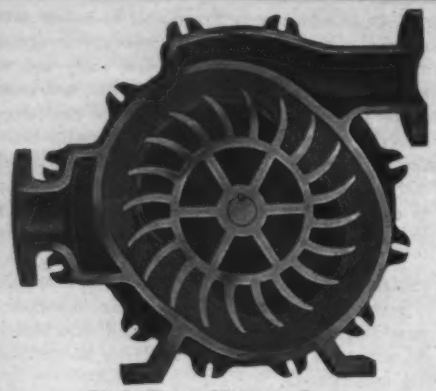
CASH: No comment is required on this asset except to state an axiom; that is, no business should have too much idle cash on hand, for very soon the slow pay customer and the manufacturers with long lines get the excess.

ACCOUNTS RECEIVABLE: A general paper house should by all means keep its printing trade accounts in separate ledgers from its wrapping and industrial accounts. The customers who buy printing papers are (with minor exceptions) a definite industrial group. The terms, cash discounts, losses from bad accounts, daily buying activity, average amount of outstanding balances per account, collection problems, number of customers in proportion to total sales and length of time sales are on books before collection—all of these elements differ in ratios (some very materially) from similar elements existing in the wrapping paper (and other miscellaneous merchandise) departments of the business.

The division of these accounts simplifies and clarifies credit and collection work and ledger reference, and provides a means of ascertaining the ratio of outstanding accounts in the two main divisions of the business. Constant study of this ratio and action based on this study leads, or should lead, to the desired capital turnover on accounts receivable.

MERCHANDISE ON HAND: A perpetual inventory record is vital to the satisfactory operation of a large paper house and important to smaller houses and there is no reason whatsoever for this record to be anything but very closely accurate, let us say, within less than one per cent inaccurate on the total of stocks carried during the course of one year.

Under a well-run system, it is not only practicable but also desirable (this refers more to wrapping papers and twines) to keep a record of gains and losses from market fluctuations. Two paper houses now keep such information and keep it accurately. Where a house makes a total satisfactory net profit and knows, for example, that two-thirds of that profit were earned from sources largely or entirely uncontrollable, the executives will face the ensuing business peariod with a more intelligent outlook. Such executives will know that the current ratio of expense to merchandising margins is inadequate and presumably will take whatever steps are necessary to overcome such maladjustments. Those operating in the dark will discover such conditions several months or one year later. A good example is known by me of how such information but for use as a basis of a study of turnover and a couraging exceptional effort to correct an unsatisfactory merchandising condition in one period when competitors were unaware of their true conditions until from six months to one year later.



Nash Hytor Vacuum Pump

Surpassing All In Its Field Is The Nash Hytor Vacuum Pump

This pump is unexcelled for use in connection with suction rolls and flat boxes, also the Vickery Felt Conditioner. It has only three principal parts with but one moving part, the rotor. There are no valves, pistons, rods, crankshafts, loose vanes or gears; it requires minimum power, maintenance and upkeep.

OUR LATEST DEVELOPMENT, the JENNINGS HYTOR FLAT BOX UNIT, with DIRECT CONNECTED SYNCHRONOUS MOTOR makes a very efficient, compact, durable and reliable equipment for handling the water and air from flat boxes and is the most superior pump introduced in this field.

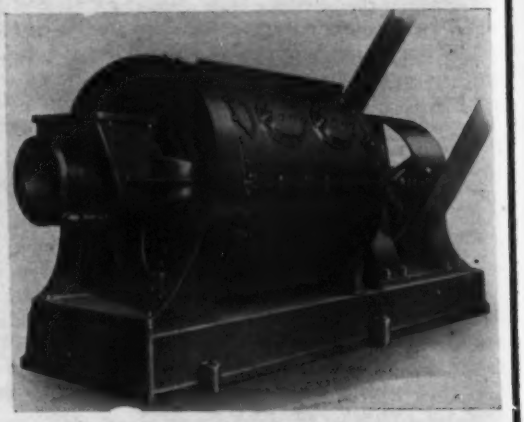
The **BIRD PULP SCREEN** is in highly satisfactory use in a number of mills throughout the country. This Screen is of highest efficiency and we guarantee to screen your stock with less than 1 horse power per ton to drive it, this including the elevation of the screened pulp to a height of 6' to 10' which is a very important feature. The principle of this screen is such that foaming is eliminated; the impinging of stock at pressure against the screen plates is also eliminated so that there is minimum cost of maintenance.

WE SHALL GLADLY SHIP ONE ON TRIAL.

Sold by

THOMAS H. SAVERY, Jr.

653 Railway Exchange Chicago, Ill.



Bird Pulp Screen

GOOD RAGS
FOR PAPER MILLS

NEW CUTTINGS

THE LESHNER PAPER STOCK CO.

INCORPORATED

CINCINNATI, OHIO

WAREHOUSE—HAMILTON, OHIO

BRANCH—CLEVELAND, OHIO

It is hardly necessary to set forth here what the stock cards should yield in the way of information, except to state that a card (in different color) should be provided for mill shipments so as to tell the whole story of the sales of line or given make of paper.

The merchandising head (or managers) should have before him (or them) once each week a report of about five or six per cent. of the items (or monthly, twenty per cent. of the items) coming under their supervision, not primarily for immediate buying information but for use as a basis of a study of turnover and a study of current values. The items selected for study should, of course, be gathered in inter-related groups.

In addition to a study of values and sound purchasing, we may ask here, what elements of expense or loss may a merchandising department head influence favorably or unfavorably?

FIRST: We have, of course, the value of capital. Let us put this at six per cent. per annum.

SECOND: We have the possibility of market losses which may occur infrequently but which in these times (let us say for the next five years) should be estimated at three per cent, per annum on the cost of goods on hand, to be safe.

THIRD: We have job lots and unsalable merchandise, which vary on different classes of paper. Putting this at one per cent is certainly no excessive.

FOURTH: We have the cost of storage. While efficient storage comes under the responsibility carried by the head of the warehouse, yet the quantities and values carried are the direct responsibility of the merchandising heads. Storage expense runs around three per cent. of warehouse sales, or, roughly speaking, it is equal in amount to from 12 to 15 per cent. of the value of stocks on hand, this figure being somewhat more or less according to turnover but having no great variation excepting for differences arising from geographical location of merchandise.

Thus in addition to the skill required in mill negotiations and sound buying, the merchandising managers can influence favorably or unfavorably elements of expense or profit outgo to an amount of around twenty-five per cent of the value of the stocks carried.

The control of these elements is as much the responsibility of a merchandising head as mill negotiations, judgment of values, etc.

Therefore, simple and condensed reports should be prepared showing, first, the present existing condition of these elements and, second, a standard established to be aimed at. Comparisons could then be made from time to time to ascertain the point of predetermined perfection arrived at.

Suppose, for the sake of friendly rivalry and as a goal to shoot for, 1926 were made a ten per cent. year for each merchandising head. That is to say, the goal aimed at would be for each head to improve his ratio ten per cent.

Will it not be agreed that this definite task and this definite tie-up to merchandising heads, of all of the elements of profit and loss influenced by their actions should favorably influence net operating income?

Warehouse Storage

This expense is largely influenced by the merchandising heads. The head of the warehouse, is, however, responsible for the efficient storage of goods. It is difficult to set a definite standard to be aimed at here unless it be floor area. Power, light and heat, of course, require close supervision.

Frequently merchants carry insurance blindly. Sometimes they have many thousands of protection in excess of the necessary coverage, on the theory that it is always as any waste conceivable. Why throw away five hundred or a thousand dollars to insurance companies who can stand such a loss of business with less notice than paper merchants can stand such waste? Dependable cost records should disclose every month how much insurance should be carried. A variation of five per cent. or less or under the correct amount of protection is within control.

Why not include the superintendent of the warehouse in this 1926 (ten per cent. year) and give him a definite goal to shoot at? Perhaps the insurance rate can still be reduced or perhaps the amount in force is ordinarily much too great. Less floor area occupied, consistent of course with efficient operation by the workers, may be also possible.

If all merchandising department heads and the superintendent of the warehouse come in under the wire in our "ten per cent year," they will have reduced cost of storage and other outgo incidental to the cost of carrying stock by twenty per cent. But we must be careful to see that, if the merchandising heads come through and the superintendent and the superintendent of the warehouse does not, he receives no credit for something he did not do.

Warehouse Handling

Here the primary factor is orders—that is, the cost per order handled. It is presumed, of course, that layout and the placement of stock has been planned intelligently, meaning that fast moving items of stock has been planned intelligently, and that fast moving items should be most accessible. The total volume of business transacted should be entirely ignored in studying warehouse handling expense. The superintendent of the warehouse should think in terms of cost per order. It is obvious that all handling expenses should be grouped together. Compensation insurance, for example, on the warehouse workers should be in this group of expense. When the *entire* handling expense is ascertained, the cost per order is arrived at by dividing warehouse orders into handling expense. While this might be analyzed down to separate floors or separate merchandise departments, this is hardly necessary. The problem here is cost per order and in a "ten per cent" year, of the superintendent reduces his cost per order handled ten per cent on the total orders (a few cents per order), he has come in under the wire regardless of the results of separate departments of paper stock or regardless of what efforts have been made by other executive heads of the business.

Get the warehouse superintendent thinking in terms of cost per order, and also get him to realize that every employee costs more than just his bare wage, meaning of course that every employee creates several dollars of additional overhead per week, and this executive will approach his part of the general operating problem more intelligently and much more effectively.

The average quantity or value per order should, of course, be watched from time to time in connection with handling cost per order.

Cartage and Delivery

This functional part of the business is also influenced largely by the number of deliveries or orders.

The man in charge of cartage and delivery, I presume, it would be the warehouse superintendent, should view this expense on a cost per order basis, also giving some attention to the average value per order. The broad statement may be made that few, if any delivery systems are so efficient that their cost cannot be reduced by ten per cent if intensified and intelligent effort be put forth. If the head of this functional part of the business were to get firmly in mind the importance of cost per order in connection with this expense, his responsibilities and viewpoints would be much more definite.

Little is gained by studying this expense in connection with dollars of sales, and unsound conclusions might easily be drawn in so doing.

Office Expense

Here we have a major group of expense which should be considered strictly in terms of cost per order, and, under no circumstances, should the total volume of business be considered in connection with office expense.

Again it should be borne in mind that every additional employee costs more than just his or her salary. When this expense is considered in terms of cost per order, we again have an entirely different outlook on the part of the office management. It often happens that a general increase in dollars of sales condones or

rather appears to warrant increases in personnel or in salaries in functional parts of the business which may, as a matter of cold fact, have already shown unwarrantable increases in expense.

With the attention of the office management directed to this expense on a cost per order basis, it is not likely that this viewpoint would disclose opportunities leading to fruitful results in our "ten per cent year?"

Administrative Expense

This group of expense would come largely under the care of the principal financial executives. The amounts of expenses incurred will usually follow the dollars of sales as a general proposition.

Selling Expenses

Here we have the functional part of the business which not only incurs the largest part of the expense but the management of which can cause serious waste throughout the whole business.

The basis used for compensating salesmen can have a very great bearing on whether the sales force seeks to book profitable orders or unprofitable orders, and profit or loss by no means always hinges on the percentage of gross margin.

Selling expense, representing as it does around one-third of the total expenses, should be definitely controlled on the basis of net revenue produced, and the only way this can be done is to pay salesmen a salary or commission on a net profit basis. By adopting that basis, two conditions are brought about:

FIRST: This major part of the total expense is very definitely budgeted on the basis of definite net performance.

SECOND: The sales force must sell in the most efficient and profitable manner in order to obtain its greatest reward.

It is common practice to analyze salesmen's sales by numerous commodity groups. After long observation of the uses to which such information is put, I am now convinced that it is practically worthless. The commodities bought by individual customers are or could be made to be very valuable information because this data points to the direct road of sales possibilities. To merely recap a salesman's sales by commodities leads nowhere. This research, if done at all, should practically ignore the totals of the various commodities sold by a salesman and should go right down into the record of the individual customer.

Another point about commodity analysis by salesmen. Here we have two salesmen who sell an equal volume of warehouse business. One, let us call him "A," sells a goodly lot of each main commodity group. His average order is $10, and his average percentage of gross margin is 28 per cent. Then we have the other man, call him "B," who sells a limited line, whose average order is $25, and whose average percentage of gross margin is 24 per cent. Before your attention was directed to per order costs and per order values, "A" would have been considered the most valuable salesman ipso facto, and on a commission basis would have received about 15 per cent more pay than "B." Now we know (in the absence of detailed data) that "B" is likely among the most profitable men on the house, whereas "A" probably returns the house an actual loss.

Therefore, the sales statistical record of real value is the record which gets down to net profit per salesman. A summary of all customers assigned to one salesman will show that salesman's results and a comparison of that salesman's average results per order with the general house average will clearly show whether he and, through him, his customers, are an anchor to the business or a propeller, that is to say, whether he is below house averages or above.

An Asset or Liability

Every customer is either an asset or a liability to the house, and primarily it is the units in which he buys and not what he buys which determine whether he is an asset or a liability. Good net profit customers are just about as scarce as red-headed eskimos. Fair net profit customers are a little more common. But net loss customers are now relatively as numerous as mosquitoes in an Arctic summer. Who are these three classes of customers, by name, and why? Can the last two be improved? And whose job is it to improve them. First of course, the sales management, and finally, of course the salesman.

A house whose warehouse sales are kept constant at, say, one million dollars for five years and whose average value per order is increased from $15 to $25 (if the average is increased from the bottom up instead of from the top up) will make more actual dollars of net profit from then on than will a house which develops its volume an additional half a million, come as it will.

Prudence urges the admission that the possibilities of bringing about such changes are limited in the sale of printing papers. But how limited are they? As to wrapping paper sales, two housewives have already demonstrated that on a given volume of business orders filled can be reduced by one-fourth to one third. By following the recommendations set forth in the recent booklet "Net Profit Control" any house can bring about such a constructive and gainful result.

In the foregoing outline we have covered every functional part of the business.

The effectiveness of every part is to be gauged by the factor which measures true results.

Merchandising Heads

The merchandising heads are responsible for turnover and partly for storage expense. Incidentally, in studying turnover, I would urge that individual cards be made up for each item carried so that the merchandising heads may visualize the items in stacks of turnover rates, four or five stacks each representing a different rate of turnover.

The findings and results of merchandising research may be prepared in report form and the data properly arranged for study.

Superintendent

2. The superintendent of the warehouse will be held partly accountable for warehouse storage, his part being very easily set out. He will receive expense reports for his study showing costs per order for warehouse handling, average value per order, etc., and his effectiveness will be gauged on that basis. He will receive similar reports covering cartage and delivery expense.

Office Management

3. The office management will receive detailed reports of expenses showing cost per order and its effectiveness will be gauged by this factor alone and not by volume of sales.

Sales Department

4. The sales department would operate on an appropriation from net revenue after house expense is provided for. This appropriation is really the only sound basis of allotting expenditures for all selling expenses, including advertising.

The sales department's most important task would, from time to time be to lift numbers of customers from the unprofitable class into the fair class and customers from this class into the good class, and this would be accomplished by reducing the cost of service now required to fill a customer's orders.

We know that, if the same volume of business can be transacted with a customer on half the service rendered, the account might be changed from a liability to an asset. Here is a challenge to sales management and salesmanship. We might bear in mind that different classes of merchandise sell in different average units. It begins to be very clear now that more net profits can be earned on unknown papers of good value (*if the sales de-*

partment can sell a satisfactory volume) than can be earned on well-known papers; first, because better than orthodox margins are often obtainable and, second, because well-known papers attract many small orders.

Each Unit Should Stand Alone

All through this plan of executive control care should be exercised that each functional unit stands on its own feet. If, for example, the efforts of the sales department result in a twenty per cent reduction in orders for the same volume, office management can claim no credit for a saving in office expense nor warehouse management in handling and delivery expense. On the other hand, one executive department might bring about a very favorable improvement in its results, even though the results of the whole are unsatisfactory. Such a department is clearly entitled to whatever recognition the occasion warrants regardless of the composite results of all. (Applause)

PRESIDENT CARPENTER: Gentlemen, you will remember a year ago at this meeting we had considerable discussion about import of papers. I am going to ask for the report of the Chairman of the Import Committee, Mr. Considine.

Report of Import Committee

N. A. CONSIDINE: You are all familiar with the resolutions that were passed at the last meeting, authorized the establishment of this committee. Your Committee's first consideration came to a head shortly after the meeting here. The tariff law stated that standard news print paper was to be free of duty. There was no definition of what standard news print was, which left the door open to a wide divergence of opinion as to what class of paper was duty free and what was not.

The Bureau of Standards proposed a standard definition, and at a hearing in Washington your Committee acting on instructions from your president appeared and filed a brief on behalf of the National Paper Trade Association. At this meeting there were also present members of the manufacturers' import committee and representatives of the Newspaper Publishers Association. While the manufacturers were urging a strict and limited definition of newspaper paper, the news print publishers wanted free admittance of almost any grade of paper used by newspapers.

Your committee had nothing to say as to what standard news print was or was not, but we did go on record as insisting that the paper merchant be permitted to import free of duty the same as the publishers. This may have seemed an unnecessary insistance in this great country where we are all supposed to be equal, and where a law that is made for one class of people is also supposed to apply to another.

Action of Committee Important

However, to show you that the action of our Committee was important we call your attention to the fact that in the original draft of the definition of standard news print sheet "news" was left out and was to be classified as dutiable paper. Your committee also believes that had we not protested the paper merchant would have been eliminated from the import of news print paper entirely, regardless of how he used or sold the paper by an administrative venture which aimed to admit free of duty and with little inconvenience paper shipped direct to and imported by newspaper publishers and make importations by all others dutiable.

This situation has not been entirely settled to your committee's satisfaction. We have no criticism of the new definition promulgated, but we would submit for your consideration the following paragraph for the letter of the head of the U. S. Customs to the collectors of the various ports which accompanied the definition of news print. I am quoting now from that letter:

"In view of the fact that Congress intended that news print paper consigned to newspapers or for their use should enter free of duty, the Department does not deem it necessary to inspect all importations. Customs officials, therefore, are advised that there shall be no delay in importations consigned to newspapers, agents of newspapers, dealers furnishing news print to newspapers, but the Department does require inspections and examination of all importations consigned to firms or individuals as standard news print paper when those firms and individuals are not in the business of furnishing news print paper to newspapers."

Paper Merchants Continually Harassed

In practice we understand that practically all importations of sheet news and of roll news particularly through the Port of New York are returned as dutiable. Paper merchants in New York are continually harassed by having to fight for every shipment. They have to put up the money for duty and then wait six months or a year before the Court of Appeals will hear their case

We contend that news print paper is news print paper regardless of who imports it. The paper merchant should be permitted to put this paper in his warehouse, list it as such in his price list and offer it for sale to the public at large without question as to who is going to buy it and what he does with it after he does buy it.

The biggest task of your committee has been the situation created over the classification of importations of certain types of unglazed sulphite and M. G. papers as greaseproof and imitation parchment. Classified as the latter, these importations are dutiable at prohibitive rates. The members of your Association importing these grades claim that these papers should be classified as wrapping paper and dutiable at 30 per cent.

A circular letter was addressed to all the members of your Association asking those who had experienced difficulty in this regard to furnish details to the Chairman of your Committee. A number of letters were received and your committee advised these members to appeal the classifications and if the case came up for trial to ask for a postponement pending the hearing of a test case which was being prepared in New York.

Many Technical Points

This was done because we felt that there were so many technical points involved in these questions that the preparation of the test case would subject the individual members to a great deal of expense.

This test case is not being conducted by your committee. It is being prepared by a firm of attorneys who, we are informed, represent a large number of New York paper merchants, many of whom are members of this Association and who have taken appeals from classifications, and also by certain importing paper interests not represented in this Association.

We have conferred with these attorneys and the test case which they have prepared is scheduled for this week when the presence in New York of paper merchants from all over the country will make possible the securing of expert testimony as to the correct trade meaning of various terms used in the industry.

This hearing will be a court proceeding and will be held in the Appraiser's Stores, 641 Washington Street, Room 946 on Friday, February 26th at 10:30 A. M. Any members of this Association who are interested or who desire to appear and give their testimony are invited to attend the hearing and further information will gladly be furnished by members of the Committee.

World Sources Should Be Kept Open

In closing, your Committee believes that it is of the utmost importance for the progress of the paper merchandising business of our country that the world sources of supply be permanently kept open. News print production is rapidly leaving our country

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for Canada. Increasing quantities of pulp are being imported every year and there are rumors of restrictions in the export of pulp and pulpwood by foreign governments which in future may have a serious effect on the established course of business in our paper markets.

We should be prepared for this situation when it comes. For the past six months because of the improvement of economic conditions throughout the world the restoration of Europe and the declining prices in the United States, there has been little interest in imported papers. This condition is apt to continue for sometime. Nevertheless, your Committee believes that because of the importance and the number of unsolved problems remaining to be heard by the Board of Customs Appeals and because of the interest in imported papers, the permanent interest in imported papers on the part of your membership in the Southern states which are remote from American producing centers and the possibility of future developments in industry, we recommend that your import committee be continued as a permanent part of this organization.

PRESIDENT CARPENTER: Do we have a motion to approve of that report and continue the committee?

A. M. MILLER: I so move.

(The motion was seconded and carried.)

PRESIDENT CARPENTER: Mr. Albert Miller has something to bring up now.

Remarks by Mr. Miller

A. M. MILLER: Mr. Chairman, this has been a very sad year for our Association, and I want, in addition to the tribute we paid to Mr. McQuillen, at this time to ask you to pay tribute to two of our members who have died since last year, Isaac W. Carpenter, President of the Carpenter Paper Co. of Omaha and Mr. R. E. Parker of the Parker-Thomas-Tucker Co. of Chicago. I will ask you all to rise for a moment.

(The members arose and remained in silence for a moment.)

PRESIDENT CARPENTER: Now we will have the report of the Board of Directors.

Matters of Importance

SECRETARY RIDGWAY: Your Board of Directors desires to bring to the attention of this meeting a number of matters which had consideration and action at its meeting Monday of this week.

The Board voted to hold the customary Fall meeting in Chicago this coming October. The Board also authorized the appointment of a committee on packing to cooperate with a like committee of the American Paper & Pulp Association.

Under the provisions of the By-Laws the Board submits to this meeting the following nominations for officers for the ensuing year:

President—A. M. Miller, Columbus, Ohio.

Vice-President in Charge of the Fine Paper Division—Mr. W. N. Gillet of Chicago.

Vice-President in Charge of the Wrapping Paper Division, Mr. J. C. Mallalieu of New York.

Treasurer, Mr. K. S. Warner of New York.

We want to hear now from our new President. (Applause.)

President-elect Miller Speaks

PRESIDENT-ELECT MILLER: Mr. President and Gentlemen: I feel that I have already talked myself hoarse today and bored you enough. I appreciate, however, the honor that has been extended to me. I fully appreciate, the importance of this industry. I was reminded the other evening that the paper and printing industry was the third largest in the country. So that our responsibility in our part of it is a tremendous one.

I appreciate that the interest on the part of the membership at large is so great at this time and the activity of you all is so intense that you feel you can trust the presidency to so young and inexperienced a man as I am. You know, there is only one man who has ever been elected to this chair who was younger than I am. That was your first President, my father, who was a few months younger than I am now. I hope I will be able to stay with you as long as he has and be as effective. (Applause.)

Remarks by Mr. Gillet

PRESIDENT CARPENTER: We would like to hear from the Vice-President of the Fine Paper Division, Mr. Gillet. (Applause.)

MR. W. N. GILLET: You will probably think it is an alibi that I had much the same thoughts going through my mind that Mr. Miller expressed, but he beat me to it. The fact is I did take up the larger part of the program this morning and I think it would be entirely out of order for me to take any more of your time.

No one could be elected to this office without appreciating the honor and the confidence conferred upon him. At the same time, I can't help but have a feeling, a very keen feeling that the responsibility really outweighs the sense of honor.

All I can say, gentlemen, is that I will devote my best efforts and interests to the furthering of this organization and that I will ask that it be put on a fifty-fifty basis—that you give as much as the officers give.

We will have to admit that every constructive move in the paper industry has emanated from this Association as far as I know. We can only look to this organization and to the strengthening of this organization to keep on with our progress. (Applause.)

PRESIDENT CARPENTER: Some one will please escort the Vice-President of the Wrapping Paper Division up to the front of the room. (Applause.)

Remarks by Mr. Mallalieu

J. C. MALLALIEU: Gentlemen, I was Vice-President last year, but it seems I am still junior Vice-President. Fine papers, of course, take the lead.

Seriously, I feel this is a very great honor. To me, however, it would be an empty honor if I did not feel that we had made material progress in the Wrapping Paper Division during the past year and that we anticipate making still more progress during the coming year.

The progress we have made is to be attributed to my old as well as my new friends in the support they have given me. I have had the guidance of Jim Carpenter during the past year. We are losing him. I need your support more than ever. I ask you to kindly give it to me. (Applause.)

PRESIDENT CARPENTER: Gentlemen, have we anything to come up under unfinished business?

MR. WELLHOUSE: Before we close this meeting, I want to ask that this body kindly give a rising vote of thanks to our retiring officers for their untiring efforts during the past year.

CHICAGO CONDITIONS SATISFACTORY

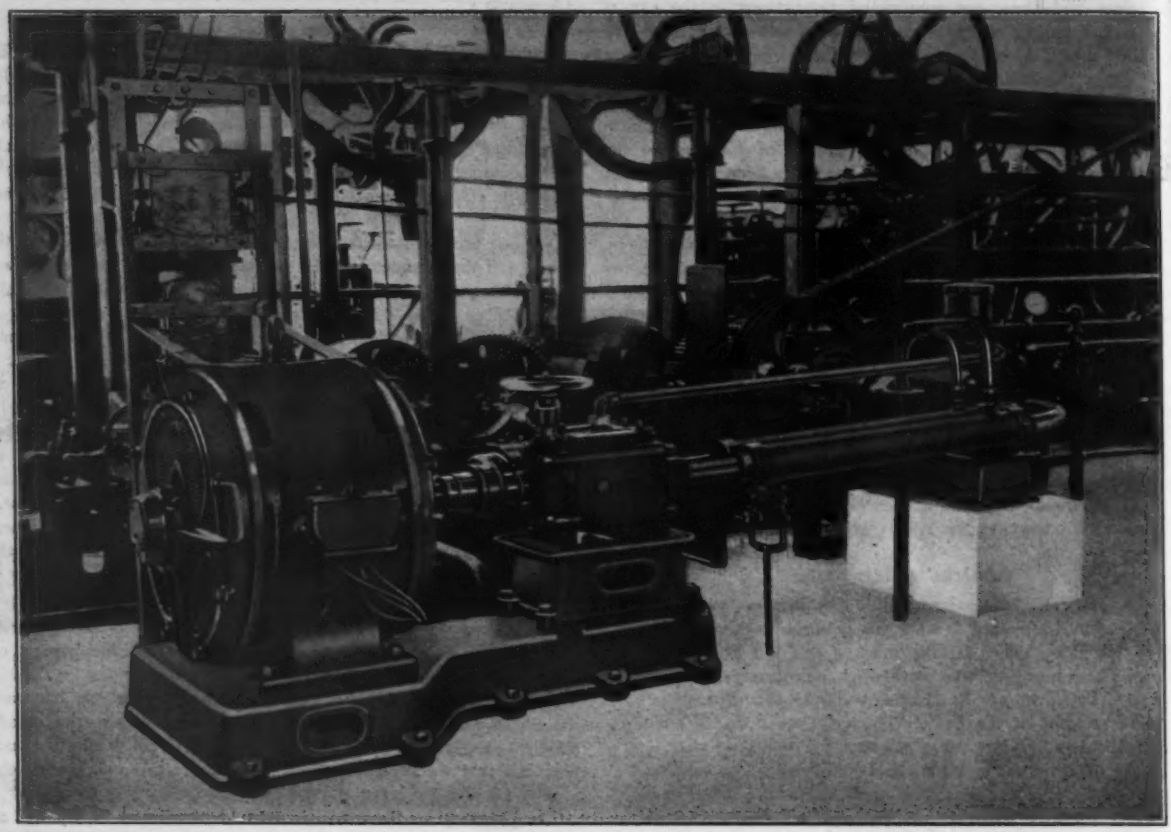
One of the most encouraging reports from the Chicago paper field is that of continued large and numerous shipments. Tonnage bears up well, signifying good sales. There is a substantial feeling of satisfaction among the men of the paper industry, induced by this condition. The present trend is along the lines of normality, no matter from what angle the subject be discussed.

The present state of normality in the market extends to the conditions at the mills. With sales which in many cases insure busied production far into March, the mills are in splendid condition; labor and mechanical conditions were never better than they are right now.

Printers and allied industry adherents are using their quota of paper, although the printers could increase their business. The most recent visits to printers indicate that they are not running at full capacity, at the same time holding up well with a demand for printing papers that is healthy.

F. A. LEAHY RETURNS FROM ABROAD

F. A. Leahy, vice president of the Eastern Manufacturing Company, returned to New York on the S.S. Paris, February 10, from a two months' trip abroad.



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On many of the older paper machines it has replaced variable speed steam engines or motors or the various forms of cone pulley drives previously used. New machines being built will be equipped with sectional drives using the Universal Hydraulic Variable Speed Gear on each section. Such a drive now in use has demonstrated its superiority to any other.

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Obituary

Thomas M. Simpson

After more than half a century of association with the Philadelphia paper industry Thomas M. Simpson, treasurer of the Atlantic Paper Company, passed away at his home in Philadelphia. His death came suddenly in his 71st year. He entered the Quaker City paper distribution field as a young man at the head of his own business the T. M. Simpson Company, in 7th street below Market. Later he became associated with the Garrett-Buchanan Company as head of the card board and cards department, this end of the business being his specialty in his own concern. He remained with the firm for almost a decade then became associated with the I. M. Megargee Company and upon the death of Irwin M. and U. S. Grant Megargee took over that firm's paper distribution affiliations. Later upon the consolidation of the I. M. Megargee and the Megargee-Green Companies, he joined with Thomas J. Hare, head of the latter firm in forming the Megargee Hare Company with Mr. Hare as president and Mr. Simpson as vice president and secretary. There was also in that firm Thomas S. Furlong, now a member of the Wilcox Walter Furlong Company who was its vice president. Four years ago, upon the consolidation of the Megargee Hare Company with the D. L. Ward Company, Mr Simpson joined its official body, later, leaving the Ward firm to open the present Atlantic Paper Company. The other members of the consolidated Megargee-Hare Company, Thomas S. Furlong and Mr. Hare also joined the Ward Company at the time of its merger.

The present organization of the Atlantic Paper Company comprising President Hare, Vice President Frank Barthmaier and Secretary George W. Hassan, joined with Mr. Simpson as its treasurer, in organizing the company about four years ago taking over warehouse and offices at 6th and Cherry streets and later moving to its present quarters in Walnut street, and conducting a fine paper business. During the war he served as an advisor to the war department on the conservation of paper.

He is survived by his widow, Helen K. Simpson, two daughters and two sons, David Allen Simpson and Thomas M. Simpson, Jr. both engaged in the paper business under the Paper Utilities Company, in Philadelphia.

George D. Lapham

In the passing of George D. Lapham, the Whiting Paper Company suffers the loss of their Philadelphia branch manager who, for the past decade, has been in charge of their Quaker City interests. Mr. Lapham has been associated with the Whiting Paper Company, in its Philadelphia offices, 619 Chestnut street, for more than a score of years, having prior to his appointment to the managership been head of the bookkeeping department. He succeeded Joseph Welsh ten years ago, upon the resignation of that manager to enter business on his own account. Mr. Lapham's death followed a week's illness from influenza which developed into abscesses in the ears and poisoning the system. He was well known as a choir singer identified with the First Baptist Church and other choral societies and had often entertained the stationers and trade association with his excellent baritone voice. His death last Friday occurred at his home, 1025 Barlyn Road. He is survived by his widow, Mabel C. Lapham, and a son.

William H. Scott

William H. Scott, for 34 years master mechanic of the Kalamazoo Paper Company and also vice-president of the Western Board and Paper Company, Kalamazoo, Mich., died Monday afternoon, February 15.

He was the son of Henry Robley and Eliza Eleanor Scott, and was born in Gun Plain township, Allegan County, February 28, 1863. He married Miss Allie P. Phillips of Detroit in 1882.

Thirty-six years ago Mr. Scott moved to Kalamazoo, shortly after becoming associated with the Kalamazoo Paper Company as master mechanic, the position he has since held. He has seen this concern grow from the small industry, located on the site of the present Monarch division of the Allied Paper Mills, to one of the largest paper making companies in the country.

He was also vice-president of the Western Board and Paper Company, for three years was president of the Gull Lake Association, member of Anchor Lodge, 87, F. and A. M.; Peninsular Commandery, No. 8, Knights Templar and Kalamazoo Lodge No. 50, B. P. O. Elks. Mr. Scott served on the Public Utilities Commission from the time of its organization until the commission form of government went into effect in Kalamazoo. He was practically a life long member of the Baptist church and active in that society, until ill health prevented further participation.

William N. Chapin

William N. Chapin, of the Waterfalls Paper Company, 200 Fifth avenue, New York, died of acute indigestion early Sunday Morning, February 14, at the home of his son, Newton Chapin, in Pittsburgh. Mr. Chapin left New York on Thursday with Mrs. Chapin to visit their son, and was apparently in good health until a few hours before his death.

Mr. Chapin had been engaged in the jobbing and mill ends of the paper business since the early eighties, about thirty years ago being connected with the Ticonderoga Pulp and Paper Company as sales manager. Later on he conducted an office as paper mill broker, about eight years ago connecting with the Poland Paper Company as New York representative. In the fall of 1920, when the mills were taken over by other interests, Mr. Chapin was continued, and has remained in the service of the Waterfalls Paper Mills continuously.

A CORRECTION BY MR. BECK

Ralph P. Bell, once president and manager of the Canadian Pulpwood Association, Halifax, N. S., writes the PAPER TRADE JOURNAL as follows:

"The article in your issue of February 4, entitled 'Canadian Paper Men Meet in Montreal,' has just been brought to our attention, and under the sub-heading reading 'The Export of Pulpwood,' we note that in common with some of the Canadian papers you have unintentionally misstated what actually happened in this connection.

"For your information we enclose herewith a copy of a formal correction which appeared in the Montreal *Gazette* of February 2, 1926, over the signature of Edward Beck, secretary, Canadian Pulp and Paper Association."

The correction referred to by Mr. Beck is as follows:

"May I correct a technical error appearing in the *Gazette's* otherwise excellent report of the annual meeting of the Canadian Pulp and Paper Association. The resolutions adopted a year ago in support of an export tax on pulpwood was neither reaffirmed nor changed in any way, the attitude of the association remaining exactly as it was before. The resolution which was offered, and subsequently withdrawn, dealt with a different phase of the subject altogether. In withdrawing it, the proposer did so from a desire for harmony, but not, as inferred in your reports, as a supporter of the original resolutions. On the contrary, he voiced his opposition to them."

BERMINGHAM & PROSSER CO. PROSPERS

Bermingham & Prosser Company enjoyed excellent business during 1925 according to reports filed at the annual meeting. All officers and directors were re-elected as follows: President Arthur T. Bermingham; vice-president, Walter P. Bermingham; secretary, Louis P. Simon; treasurer, Henry G. Prosser. These four and W. J. O'Donoghue constitute the board.

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AN ACTIVE YEAR IN PAPER

The numerous reviews written by representative men in the various branches of the industry and printed elsewhere in this Annual Review and Convention Number of the PAPER TRADE JOURNAL show pretty conclusively that the past year has been a busy one in the paper business. Production in practically every branch of the industry has exceeded that of the previous year, and has, in fact, in most lines established new records. Profits, unfortunately, have not set an equally good record and this is ascribed to the fact that expansion during the year has been more rapid than ever and that consumption has not been able to take care of the increased production in an altogether healthful manner. This has been especially true of boards and book papers, and some lines of lesser importance. While the manufacturers in some lines do not consider that the profits have been adequate for the capital invested, the year has, on the whole, been at least fairly satisfactory from all view points.

News print, as has been the case for a number of years past, made the most interesting record and one that is truly remarkable. There were produced on the North American continent 3,162,000 tons of news print which was almost 10 per cent more than in 1924. This record is bound to grow considerably within the next few years, as projects for new mills and mill expansions are already under way in Canada that will outrival any of the marvellously efficient plants in existence at the present time. Among these new plants will be one, according to a report coming from a usually accurate source, equipped with four 270-inch fourdriniers and capable of running at a speed considerably in excess of 1,000 feet per minute. Consumption, which during the past year kept pace remarkably well with production, will, it may be seen from this, be amply provided for, no matter how much greater may become the present surprisingly voracious appetite of the publishers for news print paper.

In spite of the heavy consumption, news print prices on contract declined $5 per ton with the beginning of this year. This, however, was said by at least one of the leading manufacturers, to be a voluntary concession in price made possible by more efficient production.

More book paper was consumed in 1924 than ever previously in its history. In spite of the demand, however, the production was more than adequate to fill all needs, as during the year eight new book machines were installed with a capacity of about 325 tons daily. The expansion in this branch of the paper industry has been unusually rapid in the past two and one-half years, which has kept production well ahead of consumption and has, of course, affected the price situation.

Boards also probably established a new high record for production during 1924. Here, however, also production is believed by representative authorities to have been too rapid during the year for the best interests of the manufacturers.

Coarse papers in general undoubtedly experienced a more satisfactory year than in some years past, but here also over-expansion was probably in large measure responsible for the fact that it was not a better year from the standpoint of profits. Mr. D. C. Everest, secretary and general manager of the Marathon Paper Mills Company, in reviewing this branch of the industry for the PAPER TRADE JOURNAL, says:

"The surprising thing in connection with the coarse paper industry during 1925 was the fact that the country was able to absorb an increased production.

"The production of papers of this character during 1925 was greater than during any corresponding period and the shipments were also greater; stocks on hand at the end of the year were lower by far than at the end of the previous year. As a matter of production and consumption it was the greatest in the history of the country, and yet neither the manufacturers nor the distributors considered it a very good year. Bags and wrapping paper were not the source of satisfactory income for the mills, the converters or the merchants.

"There was always that ever present evil of 'over-production.' 'Under-consumption' could not be blamed, for we had greater consumption than ever before, and that is all we could expect. 'Importations' could not be blamed, as the amount of wrapping paper imported was cut more than in half, as against the previous year; in fact, inportations have been rapidly declining since 1921. During that year imports amounted to ninety-one million pounds; in 1924, to fifty-one million pounds, and in the first ten months of 1925 only eighteen million pounds. The proper classification of imported papers for tariff assessment has undoubtedly had much to do with the decline in tonnage of imported wrapping papers.

"The trouble with the coarse paper industry has been the too rapid injection of new tonnage into the market. It was surprising that we muddled through 1925 and were apparently able to absorb the increased tonnage, but no one made a decent profit and the whole year was a record of humps and hollows on the graphic charts of production and shipments. This year bids fair to be a repetition of 1925. There are some new developments in the way of paper articles which will absorb tonnage, but not in sufficient volume to get rid of the excess which can be made at any time there is the slightest excuse for making it. 'Old Man Overhead' has been a dominant factor in the increasing of production, and the desire to cut him in two has been highly successful in damaging 'Mr. Profit.' The desire on the part of new companies to 'bust into the paper business' has been a contributing factor in over-production.

"The recent developments have shown a tendency toward the

restoration of a fairly decent price on some grades of wrapping, but bags and some wrapping grades are far below the price at which they should be sold, and until this situation is corrected neither producers nor distributors can hope for a remunerative business in making or handling these products. Further cutting of costs is impossible. Wood is as low as it should be, and the same thing is true of labor. Profit in this branch of the industry must come from increased sales value and a sensible regulation of the amount thrown on the market. With the possible increase in use for new products there seems to be a chance for a slightly better year in 1926. The amount of tonnage now being placed is indicative of an increased consumption over 1925, and this will help much in correcting the bad conditions of the last year."

The paper associations have been doing commendable work during the year. The American Paper and Pulp Association, under the able leadership of Mr. Norman L. Wilson, president, and Dr. Hugh P. Baker, executive secretary, has grown in membership and has increased the field of its influence. Among the more recent associations the Paper Board Industries Association and the Supply and Equipment Association of the American Paper and Pulp Association, especially, have already created a favorable impression on the industry. The new board association is a consolidation of three of the older board associations. It will endeavor, among other important things, to stabilize the board business, and if it can accomplish this even measurably it will do a great service for this large and important branch of the paper industry.

NO DUTY ON NEWS PRINT SINCE 1911

The following editorial under the caption "Canada Can Pay Back in Our Own Coin" appeared in *The Evening World*, of New York, Monday of this week.

"Premier Taschereau of Quebec recently told a meeting of the Canadian Pulp and Paper Association in Montreal that 'if Americans object to an embargo on pulpwood from private lands, the way to prevent it is to give free entry to all the paper entering the United States from Canada.' Then he added, with a rather threatening significance: 'Our American friends perhaps do not know what retaliation means, but we know something about it.'

"This no more than plain truth. Canada knows all about being hit by Washington tariff legislation. Now Canada is in a position as to pulpwood and news print paper to make us know what it means to be hit in like manner.

"Canada has become an essential source of supply for this kind of paper and its raw material, Our own sources are relatively dwindling every day. Our pulp-paper manufacturers are establishing plants across the border right along. Our tariff on imports of such paper is becoming more and more burdensome not merely to our own consumers of it but to our own manufacturing capital operating in Canada.

"Pulpwood cut from Canadian public lands is already embargoed. Now an embargo is threatened on erports of pulpwood from private lands. That would, of course, much more seriously burden our consumption of news print paper. Is a continuance of this out-of-date protective tariff on print paper worth such a cost?"

The usually able editor of *The Evening World*, judging from this editorial, is laboring under a bad misconception of the facts in this matter. There is no burdensome tariff on news print, as *The Evening World* intimates. In fact there is no tariff at all on news print.. It has been admitted free into this country ever since 1911. But *The Evening World* is correct in stating that our supplies of news print papers are dwindling. The failure of the American news print industry to expand as greatly as it should in recent years is due to the colossal political stupidity which was termed The Taft Reciprosity Fiasco and in which practically all the representative newspapers of the country selfishly helped to turn the great American news print industry over to Canada.

Only three or four news print mills, if memory serves correctly, have been built in this country since that foolish piece of legislation was perpetuated; some, however, have ceased to eixst and others are going out of business. Canada's news print industry, on the other hand, has flourished so greatly that during the latter months of 1925 her total production exceeded that of this country and she will continue increasingly to beat our production in the immediate future.

But *The Evening World* may disabuse itself of any notion that it is likely to be compelled to pay more money for its raw material because of any "out of date protective tariff on news print paper." About its only concern regarding any additional burden as to price need be that our Canadian neighbors, when they sufficiently control the market will jack up the price. And if and when this occurs the paper manufacturers on this side of the line who remember the days of 1911 will not be likely to sympathize with *The Evening World* and the other representative American newspapers who helped largely to make the present situation possible. If this transpires THE PAPER TRADE JOURNAL ventures the impression that American paper manufacturers will be more likely to repeat to their unfaithful friends, the newspaper publishers, and aptly, the old expression, "Chickens come home to roost."

DIAMOND STATE APPOINTS NEW MANAGERS

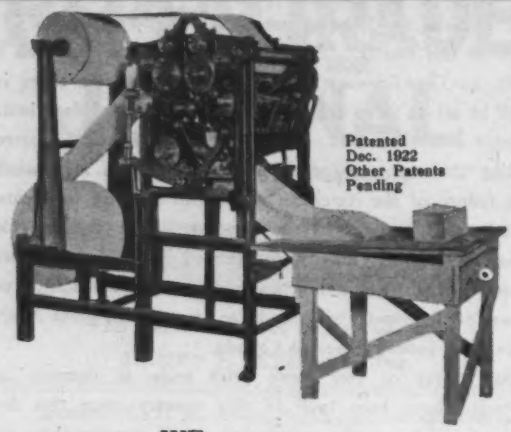
With the transfer of W. R. Elsenhans to the management of the local territory of the Diamond State Fibre Company, an office has been acquired in room 822 Drexel Building, where the new district sales manager will make his headquarters. C. M. Boegert has been appointed to the supervision of the sales territory in Connecticut as district sales manager, with headquarters at South Norwalk, Conn. These appointments were made under the direction of General Sales Manager T. E. Webster, whose offices are located in the Bridgeport, Pa., main offices and plant. The new district managers will supervise the sales of the Diamond State Fibre Company's products in their respective fields.

TO BUILD SULPHITE MILL

The construction firm of Burns Brothers and Haley, of Oswego, N. Y., has received a contract for building a $400,000 sulphite mill for the Algonquin Paper Company at Ogdensburg, and work was started on the job last week.

When completed, the mill will be the most modern and complete mills in the state and one of the finest in the country.

The mill is to be constructed on the banks of the St. Lawrence River, and it will be completed during the early summer.



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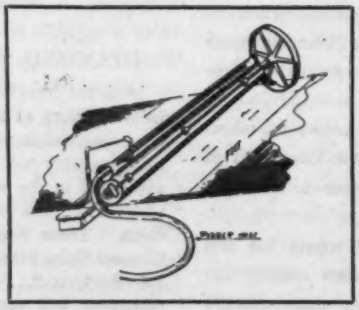
One user says:

We have had an increase of 66% in life of the felts, a decrease of 67% in running time lost on account of wet felts and 4% increase in total paper produced.



Another user says:

We are pleased to report that we have one of these felt washers on top felt and it is giving excellent results. We are now corresponding with Mr. Lansing in regard to additional washers.

This is one of the greatest inventions f or the benefit of paper manufacturers.

It extends the life of the felt from 25 to 100%. It costs practically nothing to run as it is attached to the journal of any felt roll on machine.

One mill has installed 4 and another 8 machines after thorough trial.

We can refer you to all mills where our felt washer is installed.

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Cost Accounting from Executive's Viewpoint*

By F. L. Stevens, President, Stevens & Thompson Paper Co., North Hoosick, N. Y.

Please let it be understood that I am not a cost accountant, and also please understand that the necessity for correct cost accounting did not appeal to me until we had progressed through four different stages.

In a modern paper-making company of any size, the executive is supposed to have, and should have, direct touch with all the departments of the business, such as purchasing, manufacturing, selling, finance. Each of these departments should have a specialist at the head of it, who must give his entire time and must also co-ordinate with all the other departments.

What the Executive Must Consider

The executive in buying materials, must consider the state of the market in which he purchases, and also the condition of the market in which he sells. Between these two points come the manufacturing problems, and side by side with all of it ranges the financial status of the company he represents, that is, a time may come when it seems favorable to him to buy large quantities of supplies, but the finances for such purchases must be arranged, and sometimes he must forego, what he considers favorable purchases, in order not to load the inventory of his company unduly. In considering his selling, he must keep an eye constantly upon his cost, and unless he has complete confidence in the accuracy of the figures handed in to him by the cost department, he is more or less confused.

Old and New Selling Methods

The old method of selling was to meet your competitor's price or go him one better, based upon the assumption that you were as efficient as he, and if he could sell at a price, you could also, and this method has brought more companies to ruin and brink of ruin than any other cause. The modern cost system not only tells what other goods cost, but also the cost of marketing. It goes further and divides the processes of manufacture into several well defined groups, so that each stage of the manufacture can be judged as to its efficiency.

In the course of a few years, a large amount of data will have been collected, showing the variations in cost during periods; investigations will have been made and noted as to why the cost differs in different periods; suggestions as to the reduction of costs in the different departments will have been indicated, and the executive will have constantly before him a full picture of his business from the purchase of raw material to the delivery of the goods to his customer. In doing all this, he must constantly keep in mind the fact that he is there employed as executive for the purpose of making money or profit for the stockholders.

As a general rule, the executive must rise or fall by his conduct of the business and usually the board of directors follows his lead if he is successful, and wrangle with him or displace him if he is unsuccessful. Therefore, it can be said on broad lines that he cannot have too much information to conduct his business, but there is a point whereby a cost system may become so subdivided, and so intricate that it would seem as though the business was run for the benefit of the cost system. In some instances, it is quite important to know about very small details, but in a rightly constructed cost system, these can be dug out as the occasion requires and not carried along as a load upon the general system.

Carrying a System Too Far

I have in mind a cost system installed in a manufacturing plant (not paper-making) where the executive (not a practical man), but a former treasurer of the company, became so obsessed with the idea of costs and had the different operations of his processes so finely divided and his cost department loaded up with so many clerks, that he practically ruined the company and was displaced by the superintendent of manufacturing, who brought the business back on to its feet. I merely cite this instance of carrying a thing too far. On the other hand, an executive of a paper-making company appealed to me at one time, saying that we could not make a certain paper at a certain price at which we were selling it. We were sure we were right in our cost system, and I offered to compare costs with him, which we did with the result that investigation showed we were both wrong, and while we were not selling at a loss, we found the profit that was supposed to be in the goods was somewhat fictitious. This induced us to re-vamp our cost system. My competitor had a cost system based upon the following principles:

A Competitors Cost System

At the end of each year, after inventories had been taken and books closed, he took from his books a summary of all costs and expenses excepting material. He found also from his books what his shrinkage was or loss of material in manufacture, and found what it cost him per ton to manufacture. During the following year he used this constant figure which he had found as a basis upon which to figure his cost, by adding materials plus the shrinkage. This gave him a fair knowledge as to what he had been doing, based upon past experience, but it so happened that he made several grades of paper, and as he had one figure of cost of production for his whole mill, he was obliged to apply that to each grade. Therefore, he was figuring some too high and some too low and not getting exactly right on any one of them.

Not later than December of last year, a case was brought to my attention of a paper mill, whose total sales were over $500,000.00, and upon which they had made no profit. Upon consultation with the executive of that concern, I found that he was using almost exactly the above method of cost accounting, figuring a good profit on some goods where it did not exist, and a small profit on other goods, which we could prove were his most profitable item, yet in the face of all this we have not been able to convince him that it was necessary to change his system. He dreaded the installation of two more clerks in his office. I verily believe that had he had a proper cost accountant to give him an accurate figure as to the cost of different classes of goods, he would have stressed his profitable items, and repressed his losing items, which would have enabled him to show black figures at the end of his fiscal year.

A Valuable Cost Accounting Feature

Another feature, which I consider extremely valuable in the operation of cost accounting, and almost as valuable as any other point, is the constant information, which can be disseminated through the organization as to the cost of certain operations. We have found it very advantageous to keep our superintendent and foreman of departments constantly informed as to how their department has been operating, as to volume, quality and cost during each period.

We operate what is known as a "standard" or "budget" cost system, that is, from certain data which we have we assume that the paper machine can run a certain standard production every twenty-four hours. From that assumption the cost of production can be figured and the raw materials added to this, will give the cost of paper as laid down in our storehouse. It is not always necessary to inform the superintendent as to the total cost, but it is extremely necessary that he should be informed constantly as to how things are progressing from the standard basis of production, which we have assumed. Therefore, every Monday morning a chart is posted in the superintendent's office showing what the production has been for each paper machine during the last three days, that is, Thursday, Friday and Saturday of the preceding week, and on Thursday morning another chart is posted, showing

*Address before Cost Association of the Paper Industry, at the Waldorf-Astoria Hotel, on Wednesday, February 24, 1926.

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what has been done during Monday, Tuesday and Wednesday of that week.

This gives him an exact idea of how closely he is adhering to the standard of production, and gives him an incentive to better it if possible. He makes a verbal report at the end of each of these periods, giving his ideas as to why he has bettered production or fallen below standards, and the executive is able to judge, and judge correctly the value of certain improvements and changes which the superintendent is always bound to recommend. The superintendent knows exactly what he is doing at all times, is in constant touch with the executive, and the information which they discuss is not conjecture but facts. This was very well illustrated when this system was adopted.

The Superintendent's Pet

A certain paper machine which we had in operation got to be known as the superintendent's pet. It happened to be an old machine and one upon which he, as a boy, had started as a helper. Apparently the old machine was a very good running machine, but under the general system, which we had in operation at that time, it was difficult to dig out any facts in relation to actual operation of the machine, and distinguish it from the operation of two other machines, which made exactly the same quality and grade of paper. However, under the new system, it was proven after about six months, that it was the most expensive machine we possessed, and the superintendent was the first to find it out and acknowledge it. This led, in a very short time, to the installation of a new machine in its place.

Another thing that the cost system showed very clearly was the efficiency of certain machine tenders. In the mill to which I am referring, there are six paper machines, running on the three tour system, and while some machine tenders did not show as high production during the tours as others, yet the superintendent and foreman claimed they were among the best men in the plant. The information was rather hard to uncover, and the problem was not worked out until we installed what is known as the "Tour Boss System," that is, for each tour, we appointed a foreman, who came to work with the tour and stayed with them and became in time acquainted with them. He reported directly to the boss machine tender.

Up to this time it was noticed upon the charts that the line of production in the paper mill commenced to ascend from 7 to 10 o'clock in the morning and keep at this high mark until about 11 o'clock at night, where the line dropped very considerably until the next morning. This indicated a certain lack of proper supervision. We had a night foreman, a good and efficient man, but we found he was spreading himself altogether too thinly over the whole mill, which included the ground wood plant, boiler house, paper machines and beaters, and furthermore he worked with a different crew as the tours changed.

Passing the Buck Stopped

Under the present system each tour is a unit organized and working under the same foreman and in direct competition with other units so organized. We found that this method stimulated production, improved quality, and stopped a very serious fault that happens in all paper mills. Paper machine tenders, like other people in all lines, are prone to do what is known as "passing the buck," that is, if a felt or felt rolls or any part of the machine is giving trouble and a night foreman did not happen to see it, they would nurse it along until they passed it over to the succeeding mate, who would then be obliged to shut down his machine or change a felt, or make certain repairs. Under the new system, should he do that, the report would come through the tour boss, and they very soon found out that they could not accomplish it. All these things have tended to stimulate production, improve and make more standard the quality, lessened the friction between the different machine tenders, and has accomplished what is known as "team work." Therefore, we have begun to lose to a certain extent our star performers, which we found out were not the profitable men in our employ. Practically this whole thing was worked out in watching the operations of the cost system.

In talking this over with a competitor some time ago, and explaining to him what we had done, he said it was altogether too intricate for his mill, and he could not and would not install it, yet, instead of being intricate it has tended greatly to simplif matters. Our clothing bill for our machines has constantly gr down in cost; speed and production have increased, and jeal and bickering among employees has ceased to a great extent. a man can be shown month after month actual figures, which although he may not be able to check up, he soon becomes habituated in believing. These figures of cost of production are tied into the books at the end of the period and balanced into the books, and the executive knows he is on safe ground, and is not taking hearsay evidence from anyone.

Some years ago a prominent manufacturer of writing paper told me that the competitor he most feared in the trade was the man who did not have a good cost system, but who based his knowledge on guesses and hearsay, and I have come so solidly to that conclusion that I believe it also.

Another old and exploded fable is that your cost must be very secretly kept within the office or organization, and must not, under any circumstances, be even whispered to your competitors. This, I think, is becoming to a certain extent obsolete. Your competitor is in the business for exactly the same purpose that you are, neither are in it for health or amusement.

Danger Point in Cost Accounting

The danger point in cost accounting is in having either too intricate a system or too loose or coarse a system. The intricate system will give such a variety of details that the executive is liable to become confused and deal altogether too much with frivolities, and the other system does not give him information enough, and he is obliged to guess for most of it. Between these two there is a good and safe path which can be followed without undue expense, but which will give all the information necessary and will allow him to consult with subordinates in an intelligent manner and also to seek in the markets for the profitable lines of his manufacture.

In a business where a large number of specialties are made, and where the executive is called upon constantly to bid upon special papers, the cost system is an absolute necessity.

When an inquiry or sample of paper comes from a prospective customer, if the mill is adapted to make it, it falls generally within a class of some product which they are accustomed to make. Information as to furnish, color, and all else necessary is collected by the executive or by the superintendent, and given to the cost accountant, with the estimated amount of production, and in a very few minutes he has an estimated cost.

In most instances it happens that the sample is very closely allied to something that has been made in the mill, and upon which accurate figures can be obtained. The cost accountant then, after a talk with the executive, can bring those figures up to date and give him a very good estimate.

When the word "estimate" is used, I do not want it to be confused with the word "guess." Estimate is a prophecy based upon certain accurate past information, but no one can tell exactly what the future holds. A certain paper has cost so much in the past, that is positive and we know it, and as we are constantly dealing in futures, we must use the word "estimate," which is based strictly on past performance.

Development of Cost Systems

The first cost system, with which I was at all familiar, was made from data collected and assembled during a period of the month, and certain figures were deduced from that cost system to show what was supposed to have happened. We were constantly running into trouble with it.

The next was the "job" or "lot" system, that is, each kind of paper whether made on one, two, three or four machines, was figured as a lot and a cost was prepared on them. This was much more accurately done than the first, but nothing could be dug out of that system as to cost of any particular operations.

HARDY S. FERGUSON

Consulting Engineer

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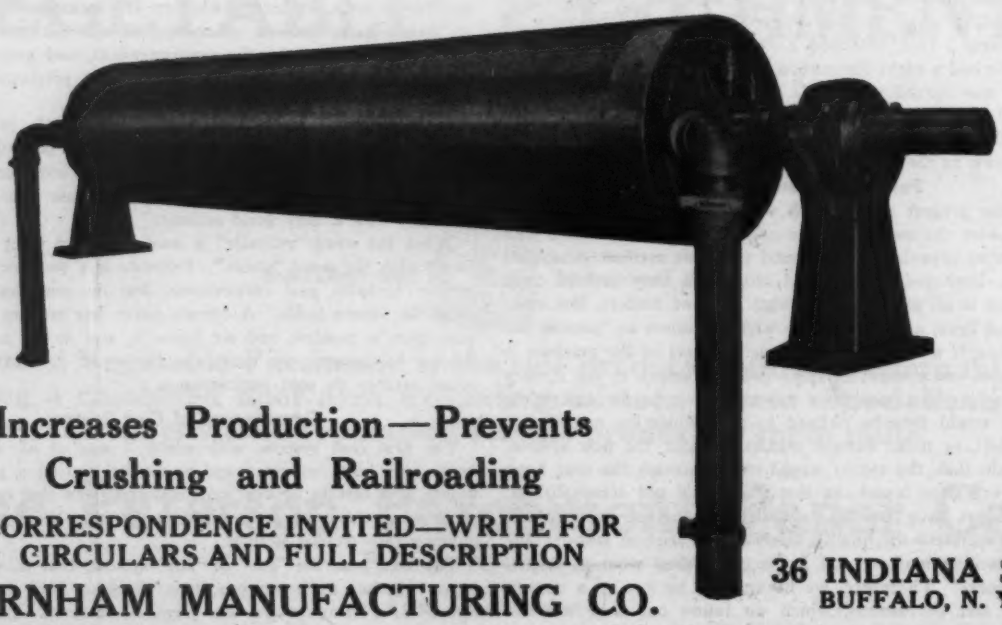

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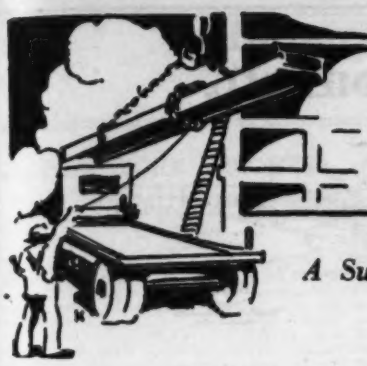

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

Salem, Ore.—The Oregon Pulp and Paper Company has tentative plans under way for extensions in its plant, to include the construction of a new unit and improvements in the present mill. Considerable additional machinery will be installed. It is expected to proceed with the project during the summer. The work is estimated to cost $450,000, with equipment.

Chehalis, Wash.—In connection with its proposed pulp and paper mill in this vicinity, the Backus-Brooks Company, Minneapolis, Minn., is said to be perfecting plans for a large hydro-electric power project on the Cowlitz River, with larger capacity than initially expected. The first unit of the power plant will be equipped for an output of 20,000 hp., to be followed by other units to advance this to more than 120,000 hp. Permission has been received from the state to proceed with the work. The entire project, including paper and pulp mills, will cost close to $15,000,000.

Kalamazoo, Mich.—The Kalamazoo Vegetable Parchment Company will hold in temporary abeyance a proposed one and two-story addition to its plant, designed primarily for office service. It is said that work will go ahead late this year or early next year. The estimated cost has not been announced. Billingham & Cobb, Press Building, Kalamazoo, are architects. J. Kindlebarger is president.

Buffalo, N. Y.—The Midland Paper Box Company, 72 East Utica Street, will soon begin the proposed rebuilding of its plant recently destroyed by fire, to be two-story and basement, estimated to cost approximately $45,000. C. A. Jensen is president, in charge.

Edmonds, Wash.—George E. Hanson, Seattle, Wash., is at the head of a project to construct and operate a local paper mill. Investigations will be made at an early date covering proposed site and facilities. The initial plant is expected to cost about $100,000, with equipment.

Detroit, Mich.—The Arvey Corporation, formerly known as the Regenstein-Veeder Company, is completing the erection of a new local plant for the manufacture of fibre board products. The new unit will be placed in service at an early date and will give employment to a sizable working force.

Mount Holly Springs, Pa.—A new company has been organized under the name of the Mount Holly Paper Company, to take over and operate the local mill of the Marr-McDonald Company, which has sold the property to the new concern. Extensions and improvements will be carried out, as well as the installation of additional equipment for considerable increase in capacity. It is expected to begin production at an early date. The plant has been idle for some time past. The new company is headed by Guy H. Davies and Byron Weston, both of Carlisle, Pa.

Piercefield, N. Y.—The International Paper Co., 100 East 42nd Street, New York, has completed improvements and alterations at its local mill to convert the unit from manila and bag paper manufacture to bond paper production. The remodeled plant will have an initial daily output of 50 tons, and is expected to develop capacity output with full working force at an early date. The company has a source of high grade pulp supply about 25 miles from the mill site. The International company has recently concluded the sale of a tract of 20,000 acres of timber properties at Waterville, N. H., to the Woodstock Lumber Company, Boston, Mass., which purposes to develop for pulp service.

Whippany, N. J.—The United Paper Board Company has been making alterations and improvements in its local Hanover mill, including the installation of additional machinery, and will soon place the plant on a full operating basis with regular working force. The portion of the mill which was destroyed by fire several months ago has been rebuilt.

Port Arthur, Ont.—The Provincial Paper Mills, Ltd., is considering the early installation of machinery for increased capacity. The company recently erected additional buildings and it is purposed to equip these for an increase of about 100 tons per day. It is reported to cost in excess of $750,000. I. H. Weldon is president.

Quebec, Que.—The Gulf Pulp & Paper Company, Ltd., 71 St. Peter street, Quebec, has engaged George F. Hardy, 309 Broadway, New York, engineer, to prepare plans for a proposed new pulp and paper mill. The project will include an electric power station, machine shop and auxiliary buildings, and is reported to cost close to $1,000,000, with machinery.

Toronto, Ont.—The Fielder Paper Box Company, 170 Berkeley street, has begun the erection of a new addition to its plant for considerable increase in output, estimated to cost close to $30,000, with equipment. It is purposed to rush the structure through to early completion. A general building contract was recently awarded to R. G. Kirby, 539 Yonge street, Toronto.

New Companies

New York, N. Y.—The Monroe Paper Box Company has been incorporated with a capital of $10,000, to manufacture paper boxes and containers. The incorporators are M. Goldberg, H. and B. Greisman. The company is represented by G. Kohan, 1133 Broadway, New York, attorney.

Hartford, Conn.—The Callaghan Paper Box Company has been incorporated with a capital of $25,000, to manufacture paper boxes and containers. The incorporators are R. and Albert Glasband, 250 Westland street, Hartford. The last noted is company representative.

Syracuse, N. Y.—The Miller Paper Company has been incorporated with a capital of $250,000, to manufacture paper products. The incorporators are F. Wyker, G. E. Bahn and F. F. Miller, The company is represented by F. & R. L. Young, Syracuse, attorneys.

Boston, Mass.—The Old Colony Paper Company has been incorporated with a capital of $10,000, to manufacture and deal in paper products. Frederick E. Church, 14 Willow Park, Wollaston, Mass., is president and treasurer.

KALAMAZOO VEGETABLE PARCHMENT CO.

Manufacturers of
PARCHMENT, WAXED AND BOND PAPERS

KALAMAZOO, MICHIGAN

Five Distinct Divisions

SULPHITE BONDS AND LEDGERS

"K. V. P." (watermarked) Bond, Glendale Bond.
Flivver Bond. Each in six colors and white.
K. V. P. Ledger—Buff and White.

GENUINE VEGETABLE PARCHMENT

The best protection for marketing Dairy Products, Meats, etc., all moist and oily foods. Rolls or flat sizes to meet all needs. Printed or plain.

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Eternally alert for new papers for special purposes.
No-Ox-Id (Rust Proof Paper).
Whalehide (An indissoluble sheet of wrapping paper).

WAXED PAPERS—Printed and Plain

Carton and Bread Wrappers—the "Stay Put" kind. Automatic wrapping and lining machine rolls.

GOOD HOUSEKEEPING PAPERS

Shelf and Lining Rolls, 100 ft., 14, 20 and 28 in. wide.
Household Parchment—Rolls, 100 ft. long, 12 in. wide.
Heavy Waxed Paper—Rolls, 150 ft. long, 12 in. wide.
Waxed and Papricloth Specialties.
Klothwhite and Drug Bond for Druggist and Stationer.

High Grade Bleached Sulphite Wood Pulp

Riordon Sales Corporation, Limited

367 Beaver Hall Square

Montreal, Canada

Imports of Paper and Paper Stock

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING FEBRUARY 20, 1926

SUMMARY

Wall paper .....63 bls., 4 cs.
Paper hangings .....56 bls., 17 cs.
News print .....416 rolls
Printing paper .....183 cs.
Filter paper .....160 bls., 37 cs.
Fancy paper .....2 cs.
Decalcomania paper .....1 cs.
Parchment paper .....3 cs.
Writing paper .....10 cs.
Waxed paper .....4 cs.
Tinfoil paper .....21 cs.
Tissue paper .....17 cs.
Surface coated paper .....7 cs.
Litho paper .....70 cs.
Wrapping paper .....22 bls.
Packing paper .....36 cs.
Miscellaneous paper .....2 cs.

WALL PAPER

W. H. S. Lloyd & Co., Aurania, Liverpool, 5 bls.
F. J. Emmerich, Thuringia, Hamburg, 53 bls., 3 cs. (7543 kilos).
F. J. Emmerich, American Banker, London, 5 bls., 1 cs. (1187 lbs.).

PAPER HANGINGS

W. H. S. Lloyd & Co., American Banker, London, 56 bls., 17 cs. (25,031 lbs.).

NEWS PRINT

Parsons & Whittemore, Inc., Pres. Roosevelt, Bremen, 388 rolls.
Maurice O'Meara Co., Pres. Roosevelt, Bremen, 28 rolls.

PRINTING PAPER

R. Reiner, Inc., Pres. Roosevelt, Bremen, 9 cs.
B. F. Drakenfeld & Co., Aurania, Liverpool, 37 cs.
Doubleday Page & Co., Aurania, Liverpool, 7 cs.
Bank of The Manhattan Co., Aquitania, Southampton, 21 cs.
Titan Shipping Co., Aquitania, Southampton, 34 cs.
C. Steiner, Thuringia, Hamburg, 75 cs. (18,946 kilos).

FILTER PAPER

J. Manheimer, Antonia, Bordeaux, 78 bls., 1 cs.
H. Reeve Angel & Co., Inc., Antonia, Bordeaux, 30 bls., 5 cs.
H. Reeve Angel & Co., Inc., Aquitania, Southampton, 40 bls., 10 cs.
A. Giese & Son, Thuringia, Hamburg, 12 bls., 8 cs. (1887 kilos).
H. Reeve Angel & Co., Inc., American Banker, London, 13 cs. (3100 lbs.).

FANCY PAPER

Whiting & Patterson Co., Aquitania, Southampton, 2 cs.

DECALCOMANIA PAPER

Phoenix Shipping Co., Pres. Roosevelt, Bremen, 1 cs.

PARCHMENT PAPER

American Express Co., Pres. Roosevelt, Bremen, 3 cs.

WRITING PAPER

L. Bamberger & Co., Liberty, Havre, 2 cs.
Guibout freres, Aquitania, Southampton, 8 cs.

WAXED PAPER

Crane Co., London Exchange, London, 4 cs.

TINFOIL PAPER

Enoch Morgan's Sons, Aurania, Liverpool, 21 cs.

TISSUE PAPER

F. C. Strype, Aurania, Liverpool, 16 cs.
Brooks Paper Co., Aurania, Liverpool, 1 cs.

SURFACE COATED PAPER

Brown Bros. & Co., Thuringia, Hamburg, 7 cs. (1472 kilos).

LITHO PAPER

Arbold & Co., Inc., Havana Maru, Canton, 25 cs.
J. H. & G. B. Siebold, Inc., Havana Maru, Canton, 55 cs.

WRAPPING PAPER

C. Steiner, Thuringia, Hamburg, 22 bls. (1079 kilos).

PACKING PAPER

International Forwarding Co., Thuringia, Hamburg, 36 cs. (5198 kilos).

MISCELLANEOUS PAPER

F. C. Strype, Thuringia, Hamburg, 2 cs.

RAGS, BAGGINGS, ETC.

L. H. Abenheimer, Pres. Roosevelt, Bremen, 91 bls. rags.
Anglo-South American Trust Co., Pres. Roosevelt, Bremen, 80 bls. rags.
Mechanics & Metals Natl. Bank, Pres. Roosevelt, Bremen, 139 bls. rags, 76 bls. bagging.
Irving Bank-Columbia Trust Co., Pres. Roosevelt, Bremen, 60 bls. jute waste.
A. W. Fenton, Inc., Havana Maru, Osaka, 20 bls. rags.
Frazar & Co., Havana Maru, Yokohama, 30 bls. rags.
S. Silberman, Havana Maru, Yokohama, 30 bls. rags.
National Bank of Commerce, Davisian, London, 48 bls. cotton waste.
Merchants National Bank, Davisian, London, 138 bls. bagging.
Ayres W. C. Jones, Davisian, London, 35 bls. bagging.
The Stone Bros. Co., Inc., Antonia, London, 52 bls. rags.
The Stone Bros. Co., Inc., Aurania, Liverpool, 96 bls. rags.
B. D. Kaplan, Aurania, Liverpool, 5 bls. rags.
A. W. Fenton, Inc., Liberty, Havre, 57 bls. rags.
Atterbury Bros., Inc., Liberty, Havre, 18 bls. rags.
V. Galaup, Liberty, Havre, 57 bls. rags.
W. Steck & Co., Liberty, Havre, 82 bls. bagging.
D. I. Murphy, Liberty, Dunkirk, 58 bls. rags.
Castle & Overton, Inc., Liberty, Dunkirk, 165 bls. rags.
The Barret Co., Liberty, Dunkirk, 655 bls. rags.
Maurice O'Meara Co., Liberty, Dunkirk, 16 bls. cotton waste.
Salomon Bros. & Co., Liberty, Dunkirk, 161 bls. flax waste.
R. Bishop Manfg. Co., Liberty, Dunkirk, 90 bls. rags.
S. Birkenstein Sons, Liberty, Dunkirk, 130 bls. rags.
Kidder, Peabody Accep. Corp., Mercier, Antwerp, 164 bls. rags.
The Stone Bros. Co., Inc., Mercier, Antwerp, 76 bls. rags.
Irving Bank-Columbia Trust Co., Mercier, Antwerp, 96 bls. bagging.
P. Berlowitz, Mercier, Antwerp, 104 bls. rags.
Chemical National Bank, Mercier, Antwerp, 153 bls. rags.
Castle & Overton, Inc., Mercier, Antwerp, 33 bls. rags.
State Bank, Mercier, Antwerp, 11 bls. rags.
A. W. Fenton, Inc., V. Emmanuele III, Cardiff, 561 bls. rags.
H. F. Watson, V. Emmanuele III, Cardiff, 183 bls. rags.
New York Trust Co., Britannia, Constantinople, 109 bls. bagging.
National Bank of Commerce, Britannia, Constantinople, 374 bls. rags.
E. J. Keller Co., Inc., Thuringia, Hamburg, 281 bls. rags.
E. J. Keller Co., Inc., Thuringia, Hamburg, 129 bls. bagging.
E. Mayer, Thuringia, Hamburg, 62 bls. rags.
Equitable Trust Co., Thuringia, Hamburg, 10 bls. rags.
American National Bank, Thuringia, Hamburg, 43 bls. bagging.
R. Blank, Thuringia, Hamburg, 221 bls. rags.
The Barret Co., Thuringia, Hamburg, 62 bls. rags.
Salomon Bros. & Co., Thuringia, Hamburg, 93 bls. bagging.

OLD ROPE

Brown Bros. & Co., Marengo, Hull, 151 coils.
Brown Bros. & Co., Stavangerfjord, Oslo, 65 coils.

MANILA ROPE

Ellermans' Wilson Line, American Banker, London, 69 bls.

HEMP ROPE

National City Bank, Doric, Liverpool, 199 pgs.

WOOD PULP

Johanson, Wales & Sparre, Inc., Carlsholm, Ortviken, 3900 bls. sulphite.
Bulkley, Dunton & Co., Carlsholm, Iggesund, 725 bls. sulphite.
Bulkley, Dunton & Co., Carlsholm, Iggesund, 2400 bls. sulphate.
Nilsen, Lyon & Co., Stavangerfjord, Oslo, 800 bls. chemical pulp.
Buck, Kiaer & Co., Inc., Stavangerfjord, Hommelvik, 2874 bls. sulphite.
Buck, Kiaer & Co., Inc., Stavangerfjord, Oslo, 400 bls. sulphite.
Buck, Kiaer & Co., Inc., Stavangerfjord, Oslo, 1000 bls. kraft pulp.

BALTIMORE IMPORTS

WEEK ENDING FEBRUARY 20, 1926

Scandinavian Pulp Agency, Inc., Carlsholm, Skutskar, 7200 bls. dry pulp.
Johanson, Wales & Sparre, Inc., Carlsholm, Gothenburg, 1625 bls. sulphate pulp.
Johanson, Wales & Sparre, Inc., Carlsholm, Gothenburg, 598 bls. dry soda pulp.
Johanson, Wales & Sparre, Inc., Carlsholm, Ortviken, 1100 bls. sulphite pulp.
E. M. Sergeant & Co., Carlsholm, Gothenburg, 598 bls. dry soda pulp.
Buck, Kiaer & Co., Inc., Topeka, Oslo, 3200 bls. sulphite pulp.
Bulkley, Dunton & Co., Curlslack, ———, 3154 bls. wood pulp.
Bulkley, Dunton & Co., Malmen, ———, 250 bls. wood pulp.
Nilsen, Lyon & Co., India Maru, Hamburg, 500 bls. wood pulp, 77 tons.
M. Gottesman & Co., Inc., India Maru, Hamburg, 1000 bls. wood pulp, 154 tons.
National City Bank, India Maru, Hamburg, 128 bls. rags.
Congoleum Co., India Maru, Hamburg, 269 bls. rags.

BOSTON IMPORTS

WEEK ENDING FEBRUARY 20, 1926

Buck, Kiaer & Co., Inc., Dania, Oslo, 200 bls. kraft pulp.
Bulkley, Dunton & Co., Napierian, ———, 226 bls. wood pulp.
Bulkley, Dunton & Co., Malmen, ———, 4655 bls. wood pulp.
New England Waste Co., Davisian, Manchester, 19 bls. bagging.
Baring Bros. & Co., Davisian, Manchester, 350 bags hide cuttings.
T. D. Downing & Co., Davisian, Manchester, 37 bls. new cuttings.
J. B. Moors & Co., Davisian, Liverpool, 28 bags hide cuttings.
Old Colony Trust Co., Davisian, Liverpool, 114 bls. rope.
New England Waste Co., Divisian, Liverpool, 29 bls. bagging.
Brown Bros. & Co., Davisian, Liverpool, 35 bls. waste paper.

NORFOLK IMPORTS

WEEK ENDING FEBRUARY 20, 1926

Johanson, Wales & Sparre, Inc., Carlsholm, Ortviken, 1900 bls. sulphite pulp.
The Borregaard Co., Inc., Carlsholm, Ortviken, 1250 bls. dry pulp.
Scandinavian Pulp Agency, Inc., Carlsholm, Ortviken, 1524 bls. sulphite pulp.
Scandinavian Pulp Agency, Inc., Carlsholm, Ortviken, 1863 bls. kraft pulp.
Scandinavian Pulp Agency, Inc., Carlsholm, Ortviken, 599 bls. sulphate pulp.

PHILADELPHIA IMPORTS

WEEK ENDING FEBRUARY 20, 1926

A. J. Holman Co., London Exchange, London, 62 cs. printing paper.
Acme Forwarding Co., London Exchange, London, 3 cs. photo paper.
Davies, Turner & Co., London Exchange, London, 6 cs. printing paper.
A. W. Fenton, Inc., London Exchange, London, 300 bls. rags.
National City Bank, London Exchange, London, 55 bls. paper stock.
G. M. Graves Co., London Exchange, London, 129 bls. rags.
A. W. Fenton, Inc., Liberty, Havre, 214 bls. rags.
Penn Rag & Metal Co., Liberty, Havre, 62 bls. rags.
Atterbury & McKelvey, Liberty, Havre, 82 bls. rags.
J. M. Jaffe, Liberty, Havre, 55 bls. rags.
L. H. Abenheimer, Liberty, Dunkirk, 96 bls. rags.
D. I. Murphy, Liberty, Dunkirk, 45 bls. rags.
S. Birkenstein Sons, Liberty, Dunkirk, 221 bls. rags.

THE GIANT
NEKOOSA BARK PRESS

will press any kind of refuse, producing a uniform dry content. Of vital importance in these days of fuel crises. Will make excellent fuel of your wet waste. Dependable, durable and low maintenance.

Several now in use in Paper Mills. In fact, one Mill has three in use; another has one in use and three on order, while many more are using one of these self-paying and profitable presses.

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"BUMAGA, NEW YORK"

New York Market Review

Office of THE PAPER TRADE JOURNAL,
Wednesday, February 24, 1926.

Trading in the local paper market during the past week was fairly active and the various grades of paper were in good demand. Sales organizations of the leading paper houses are preparing for a busy spring campaign with every confidence that the results will equal, if not surpass, last year's returns. Prices are reported to be holding up well and there is little evidence of shading.

The news print market continues to improve and buying has undoubtedly been stimulated by the new contract prices which came into effect at the beginning of the year. Production in both the United States and Canada is proceeding at a higher rate than last year. Stocks of news print paper at United States mills totalled 16,338 tons at the end of January, and at the Canadian mills 14,602 tons, making a combined total of 30,940 tons, which was equivalent to 2.7 days' average production.

The various grades of paper board continue in steady demand and prices are quite firm. The fine paper market exhibits a strong tendency and a good volume of orders are being received. The coarse paper market is also in a strong position and, with the approach of spring, a general expansion of business is confidently anticipated.

Mechanical Pulp

Demand for ground wood pulp is fairly persistent and, in the opinion of some authorities on the trade, any perceptible increase in the request from consumers will probably send prices up. Producers are reported to have little surplus stock to offer in the open market. Imported ground wood pulp continues to be quoted at a higher level than domestic, but there is comparatively little spot demand at the prevailing rates.

Chemical Pulp

The condition of the chemical pulp market is as strong as ever and quotations are very firm on both domestic and imported grades. Bleached sulphite and kraft pulp are in particularly heavy demand and as offerings are very limited an advance in prices is forecast by some observers for the near future. Orders are still being booked on account of Scandinavian pulp for 1927, according to reports from reliable sources.

Old Rope and Bagging

Demand for domestic rope has improved and prices on all grades continue to be well maintained. Dealers are said to be expecting better prices in the near future. Sales of bagging have also increased. Accumulations are limited, however, and the market is very firm.

Rags

The paper mills are displaying more interest in domestic rags and low and medium grades are moving in a satisfactory manner. The demand for high grade cuttings is rather light at present and prices are more or less nominal. Buyers of both domestic and imported rags are looking forward to a busy spring season in the belief that many customers will be forced to replenish their depleted stocks.

Waste Paper

During the past week waste paper has been in fairly good request. Many of the board mills are working at full capacity and are consuming waste paper in large quantities. Old kraft paper and book paper are in better request from the mills and prices are being well maintained in most instances.

Twine

While the twine market has been somewhat quiet, now that the spring trading season is approaching, a revival of business may be expected at any time. On the whole, prices of most grades are holding up well at recently quoted levels.

RESOLUTIONS FOR MR. McQUILLEN

At a meeting of the New England Paper Merchants' Association, Boston, Mass., the following Resolutions were unanimously adopted:

The New England Paper Merchants' Association is deeply conscious of an irreparable loss in the death of its most prominent member, William Ford McQuillen.

The Association began under his leadership, and for more than twenty years he participated in its activities, giving generously of time, patience, and strength.

Possessed of a fine business judgment, and the wisdom of experience, his counsel was invaluable—his influence far-reaching.

Recognizing our inability to understand the Divine Purpose, we bow to the inevitable.

As fellow-workers, we express our gratitude for the benefit derived from his precept and practice.

"Simple service simply given to his own kind in their common need."

The secretary was instructed to inscribe these resolutions in the records of the Association; also to send copies to Mrs. McQuillen and the Storrs & Bement Company

C. S. PROCTOR, Chairman
G. H. LOWE
F. H. BLACKMAN

PAPER BAG PLANT FOR BATES VALVE BAG CO.

The new plant of the Bates Valve Bag Company, which was started last summer and covers an extensive area of ground near Nazareth, Pa., is now completed and in operation. The company manufactures a specially constructed bag of American made krafts of durability and strength for the packing of cement and other heavy and bulky products. Until the Bates Valve Bag Company experimented with this new use for krafts after it had been successfully tried out in Sweden by manufacturers of kraft in that paper producing country, these products were packed exclusively in cloth containers. Now that it has been proved useful for this purpose the new plant of the Company at Nazareth will be devoted exclusively to production of heavy kraft bags for cement packing. The concern employs over 100 workers and produces 700,000 bags daily. The Bates Valve Bag Company has large contracts with the various manufacturers of cement in the vicinity, including the Atlas Portland Cement Company, through its specially patented devices for the filling of bags with these products. Its headquarters are in Chicago, but it maintains plants near Easton, Pa., where for several years it has been engaged in contract work with the cement company. Its departure in the use of kraft bags is unique in this country. In order to secure sufficient supply of this specially made durable kraft, the Bates Company several months ago gave a large contract extending for some time to a prominent New England manufacturer of these papers.

McENERY PAPER COMPANY
MANUFACTURERS' SALES AGENCY
112 WEST ADAMS STREET
CHICAGO

PRACTICALLY ALL GRADES

Norwood

Mechanical Filtration Plants
Gravity and Pressure Types

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NORWOOD ENGINEERING CO.
Florence, Mass., U. S. A.

F. L. Smithe Machine Co., Inc.
Manufacturers of
Envelope Machinery

for making any style envelope, regular or special. Printed, stamped, embossed and tissue lined envelopes. Also die presses, tension machines, metal clasp machines, and all other machinery used in making envelopes.

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300 tons daily
AMERICAN MADE FOR AMERICAN TRADE

some portion of our clay production is *pulverized*. That part of it which is *pulverized* is, as far as we know, the only *pulverized clay* which is washed and refined before being pulverized. This insures greater freedom from impurities and an exceedingly uniform product.

Prices of M-E pulverized clay may surprise you even considering this additional treatment.

Let us submit samples and quote you.

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In cylinders and tanks
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CAUSTIC SODA
76%—Solid and Flake
Arnold, Hoffman & Co. Inc., Sole Agents
PROVIDENCE BOSTON NEW YORK
PHILADELPHIA CHARLOTTE

Machines for the manufacture of waxed papers of all specifications, gummed and glued papers, asphalt coated and duplexed papers, and machines for special coating.
"The Mayer Laboratory Coating Machine"
(NEW MODEL 75-D)
MAYER COATING MACHINES CO.
ROCHESTER, NEW YORK, U. S. A.
"Liberal reward for information of any person or company making or rewinding our patented wire wound equalisers."

Miscellaneous Markets

Office of THE PAPER TRADE JOURNAL,
Wednesday, February 24, 1926.

No striking changes were experienced in the local chemical market during the past week. Accumulations proved ample to meet the prevailing demand for spot supplies and prices were generally well maintained. In most divisions of the chemical industry contract withdrawals continued to move at a satisfactory pace and the outlook for the immediate future is very promising.

BLANC FIXE.—Trading in the blanc fixe market was rather quiet, but the movement on contract was fairly good. Inquiries for prompt delivery were only moderate. Prices remained unchanged. The pulp is still selling at from $60 to $64 a ton, in bulk, at works, and the powder at from 3¼ to 4¼ cents a pound, in barrels, car lots, at works.

BLEACHING POWDER.—Steadiness again prevailed in the bleaching powder market. Contract withdrawals continued in good volume and the leading manufacturers are well sold ahead. Prompt offerings are rather limited. Bleaching powder is quoted at from $2 to $2.40 per 100 pounds, in large drums, at works.

CAUSTIC SODA.—The volume of business transacted in the caustic soda market during the week was satisfactory. Prices have been easier, however, due to intense competition between the manufacturers. Contract withdrawals are moving in excellent volume. Caustic soda is selling at from $3.10 to $3.15 per 100 pounds, at works. For less than car load lots the price is from $3.75 to $3.91 per 100 pounds.

CASEIN.—The casein market continues along normal lines and prices of both domestic and foreign varieties are being well held. Consumers are reported to be well covered on their immediate needs. Domestic casein is selling at from 13 to 14 cents a pound, according to grade, and foreign at around 13½ cents a pound.

CHINA CLAY.—Both domestic and imported clay are in good demand. Offerings for spot supplies are rather scarce and most of the movement is for shipment on contracts. Domestic washed clay is now quoted at $8 a ton, at mine, and pulverized at $10 a ton. Imported china clay is selling at from $13 to $22 a ton, ship side.

CHLORINE.—An active demand is being experienced for chlorine. The use of this product by paper makers for bleaching purposes is steadily growing. The contract quotation for chlorine is 4 cents a pound, in tanks, or multi-unit cars, at works, while the spot quotation rules firm at around 4½ cents a pound.

ROSIN.—The situation in the rosin market is very puzzling. While supplies are diminishing, current receipts show a marked falling off compared to last year. Prices are weaker, but a sudden rush of orders would undoubtedly strengthen all grades. At the naval stores, paper markers' grades of rosin are quoted at from $14.25 to $14.60 per 280 pounds, ship side, in barrels.

SALT CAKE.—Conditions in the salt cake market continue to improve. Many mills are reported to be filling their requirements and prices are much firmer. Contract withdrawals are also proceeding in a satisfactory manner. Quotations on salt cake range from $17 to $20 a ton, in bulk, at works.

SODA ASH.—Routine activity prevailed in the soda ash market during the week. Contract withdrawals continued to move steadily. It is expected that shipments this year will fully equal withdrawals in 1925, which were the largest in several years. Prices are being well maintained at previous levels. The contract price of soda ash, in car lots, at works, 100 pounds, is as follows: In bulk, $1.25; in bags, $1.38; and in barrels, $1.63.

STARCH.—The mill demand for starch continues fairly good, and the market is practically unchanged. Prices are holding up well and no shading is anticipated in the immediate future. Special paper markets' starch is still selling at $3.32 per 100 pounds, in bags and barrels.

SULPHATE OF ALUMINA.—The sulphate of alumina market was fairly active during the past week, and consumption by the paper mills is reported to be well up to the average. Prices have been steady for some time past. Sulphate of alumina continues to sell at from $2 to $2.05 per 100 pounds, for the iron free, in bags, at works, in car lots, and at from $1.40 to $1.45 for commercial grades.

SULPHUR.—The sulphur market exhibits a steady undertone. Contract withdrawals are proceeding in fairly large volume and prices are very firm. The consumption of sulphur by the paper mills is reported to be expanding. Sulphur is quoted at from $15 to $16 a ton, in bulk, at mine, and at from $20 to $21 a ton, ship side.

PAPER BOARD BARRELS

Attempts have been made in past years to make large containers, such as barrels, from paper either by molding them from pulp or by winding layers of paper on a collapsible form.

While they have shown considerable promise, perhaps because of the expense of manufacture they have not become commercial.

BARRELS MADE FROM PAPER

At the present time the problem is being attacked in another way which is to make barrel staves by forming them as well as the heads from paper board laminated with sodium silicate.

Edward P. Everett, Fibre Cooperage Equipment Company, Inc., New York, is the inventor of the system and also of an automatic machine for the production of staves from the paper board in the roll.

If barrels from paper board should become commercial, it would be a most important development. It is estimated that 90 million barrels is the yearly slack cooperage production alone. If but 10 per cent of this quantity were made of paper board, it is estimated that it would use close to 115,000 tons of board and 30,000 barrels of sodium silicate.

It is understood that a number of concerns, both users of barrels and makers of paper board, are investigating the development.

DRY PAPER EFFICIENTLY

The Fulton Dryer Drainage System

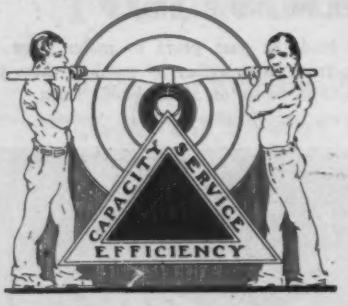
—Increased Production

—Decreased steam pressure on the dryers

—Reduced steam cost for drying

Better Sheet—Better Finish—Less Shrinkage

—and cockling prevented by drying with graduated temperature—Less pressure or vacuum on paper machine dryers.



We will gladly refer you to mills using the Fulton System and making the same grade of paper as you. They will tell you their experience with the Fulton System.

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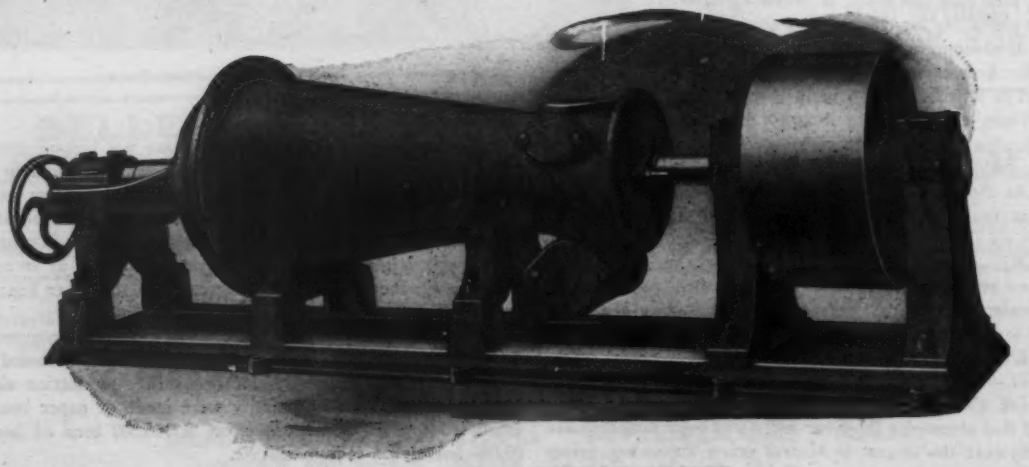

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